OCT 29 1903

BULLETIN

OF

THE JOHNS HOPKINS HOSPITAL

Entered as Second-Class Matter at the Baltimore, Maryland, Postoffice.

Vol. XIV.—No. 151.] BALTIMORE, OCTOBER, 1903. [Price, 15 Cents.

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DR. SAMUEL FULLER, OF THE MAYFLOWER (1620), THE PIONEER PHYSICIAN.*

By Thomas F. Harrington, M. D., *of Lowell, Mass.*

There is no epoch in modern history more eventful to the medical profession than that marking the closing of the sixteenth and the beginning of the seventeenth centuries. The discovery of America, the extension of the printing-press, the awakening of scientific thought and inquiry, all foretold a new era in the world's history, which should forever stand forth illumining by its warm rays all future ages. The light of reason and skepticism was to be as destructive to the demon theory of disease which had prevailed from the Middle Ages as its stimulating influences were to be beneficial to progress and advancement. The age found the man, and from the University of Basel (1526) the clear voice of Paracelsus (1493-1541) rings forth bidding the fettered mind to awake and come out of the darkness. Truly this was a wonderful man. However much we may find to condemn in his teachings and methods, his truths will ever serve as the foundation to successful medicine. "Reading never made a doctor," he said, "but practice is what forms a physician. For all reading is a foot-stool to practice, and a mere feather broom. He who meditates discovers something." Again he says, "The book of nature was that which the physician should read, and to do so he must walk over its leaves." His ætiology of diseases was divided into five causes: foul air, errors in digestion and assimilation, diathesis, disorders due to perverted ideas, and lastly diseases due to causes predetermined by God.[1]

His discoveries included metal zinc and hydrogen gas; he invented laudanum, and he anticipated the transfusion of blood; he substituted tinctures and quintessence of drugs for the filthy masses and unscientific mixtures; he introduced mercury for the treatment of syphilis, and the use of iron, sulphur, antimony, arsenic, tin and lead, as well as baths, also arnica and other vegetable remedies in the treatment of disease; he revolutionized the barbarous treatment of dislocations and fractures, honor enough, one might think, for one man. Greatly as it would profit us to dwell at some length upon the life and works of Paracelsus, the purpose of introducing him here is to point out the influence at work in the scientific world tending to produce abundant good fruit. For this result we do not look in vain. Electricity, chemistry, mineralogy, botany and pharmacy all advanced rapidly, each giving its due quota to medicine for the betterment and uplifting of mankind.[2] The medical profession received its first legislative recognition by Parliament (1511), physicians and surgeons were exempted by law (1542) from military and jury duty in order that they might be the freer to attend to their duties, colleges for the instruction of medical students were established, and laws against irregular practitioners and quacks were enacted (1542).[3] The labors and investigations of Vesalius (1514-1564), Fallopius (1523-1562),

*Read before the Johns Hopkins Historical Club, April 20, 1903.

Eustachius (1510-1574), Servetus (1511-1553), and Ambrosie Parè (1517-1590) had awakened the medical mind to the study of anatomy, physiology and surgery such as had never been done before, and plainly foretold almost to anticipation the great discovery of Harvey (1578-1657) which meant the establishment of the theory and practice of medicine upon a new and permanent foundation. Kepler (1571-1630), Galileo (1564-1642), Reubens (1577-1640), Francis Bacon (1561-1626), and Shakspear (1564-1616) were entering upon the world's stage, there to leave, each in his own sphere, a model which would stand for all ages. Providence seems to have decreed that from that age one should be born whom the followers in the new world of His works as exemplified by the Apostle Luke should find worthy of emulating.

Samuel Fuller was baptized at Redenhall Parish Church, in Norfolk county, England, January 20, 1580.[3] He was the son of Robert Fuller, who is registered as a butcher, which was ranked with the trades and professions. That the Fullers were prominent people in the parish for more than one hundred years prior to Samuel Fuller's birth is evident from the records. Unfortunately the custom of that age did not include mentioning the name of the mother in the registry of births, consequently little is known of Mrs. Fuller's ancestry. Information as to the early life and doings of young Fuller is very meagre. It is stated, however, that he had been a silk worker,[4] whether as an apprentice to some Frenchman as his friend and companion William Bradford was, can only be conjectured; positive it is, however, that at some time in early youth these two young men formed a companionship which makes it impossible to consider their lives separately. Samuel Fuller's marked career began at Leyden, where he is early spoken of as one of the deacons of that church[5] which was soon to play such an important part in the settlement of the new world. This office of deacon was not an empty one, for the deacons of the church, though laymen, were as carefully selected and formally ordained as the clergymen. Previous to coming to Leyden he had married Elsie Glascock, probably in England,[6] who lived but a short time, and in 1613, according to Leyden records, he married Agnes, daughter of Alexander Carpenter, a family of such superior position that the suit of William Bradford for the hand in marriage of another daughter, Alice, was not looked upon with favor, notwithstanding the fact that Bradford belonged to the two best families in his section. Bradford afterwards married Alice in America (August 14, 1623). Soon death again robbed Deacon Fuller of his wife, and he married his third and last wife, Bridget, daughter of Mrs. Joseph Lee, at Leyden, 1617.

Of his life at Leyden much is known. He was reckoned as one of the persons of large means,[7] and both on account of his blood and marriage connections with many of the leading families of Rev. John Robinson's congregation, as well as the power of his own force of character, he early became an active and important factor in the affairs of that band of Separatists.[8] Fuller joined the Scrooby band of Pilgrims at Leyden in 1609, where they had gone after leaving Amsterdam. This settlement included William Bradford, John Robinson, William Brewster, Isaac Allerton, Edward Winslow, John Carver, Miles Standish, William White, as well as others, all of whose names to-day are so familiar in the history of the first settlements in this country. In the negotiations and preparations for fitting out the Speedwell and the Mayflower (1617-1620) Fuller was an active and influential party. [9] He was the first signer to the letter written jointly by Fuller, Winslow, Brewster and Allerton to Carver and Cushman, date June 10 (new style), 1620, in which they sharply criticise Cushman's actions in his dealings with the Virginia Company and later with "the Merchant Adventurers" while acting as the agent for the Pilgrims.

For more than twenty years prior to the emigration of the Pilgrims from Leyden the Puritanic clergy were educated to the medical profession[10] in anticipation of their pilgrimage which persecution at home was surely forcing upon them. Oxford, too, foreseeing the difficulties in store for the clergy, incorporated the study of physic in the course for the divinity student. A part of this education consisted in the study of the ancient medical authors, as Hippocrates, Galen, Breteus, Celsus and others. Thus it was that many clergymen were eminent practitioners of medicine before they crossed the Atlantic, where necessity often forced the two duties into one. William Brewster, with whom Fuller was closely associated at Leyden, was a man of great learning and ability. In his capacity as secretary to Davison, one of Elizabeth's ambassadors and secretary of state, Brewster had many opportunities for study. He became a noted teacher and so magnetic was his style that students from all quarters came to the famous Leyden University to partake of his knowledge. His methods attracted the attention of many of the eminent men of that period. Bradford speaks of Leyden as "a fair & bewtifull citie, and of a sweet situation, but made more famous by ye universitie wherwith it is adorned, in which of late had been so many learned men." Fuller was indeed fortunate in having the friendship and association of this man, especially at Leyden, and at a time when great discoveries were being made in the field of medicine. In 1616 Harvey first expounded to his students the circulation of the blood which he published to the world twelve years later. [11] Aided by the discovery of the microscope in 1621, the doctrine of Harvey on the development of the higher animals from the ovum, as well as the acceptance of his description of the circulation of the blood, a new era was commenced in medical science which meant a complete overthrow of the followers of the Ancients, and one which effected a total revolution in the theory and practice of medicine. The science of medicine became greatly interwoven with the science of philosophy, thus broadening the human mind. Investigation and experiment supplanted dogmatism and blind faith; human dissection which had slept for fifteen centuries was revived; anatomy and physiology were studied by means of actual dissections; many new remedies were introduced in the treatment of disease, including lemon juice for scurvy, Peruvian bark for malaria, as well as sarsaparilla and guaiacum. The in-

struction of medical students in England was mostly confined to the guilds, and consisted of lectures and demonstrations in dissections for which the government furnished bodies. Besides these compulsory lectures there were many private and endowed courses. Harvey was lecturer for forty-one years (1616-1656) in one of these courses (the Lumleian "), and it was here that he first made known his discovery. Medical publications were scarce and subjected to the closest censorship. Surgeons and barbers were now recognized as separate bodies.

Surrounded by such conditions and afforded every opportunity to take the fullest advantages of his privileges, it is but reasonable to suppose that an active, energetic, studious mind, such as we know Samuel Fuller to have possessed, must of necessity become well equipped for his chosen work. In forming an estimate of Doctor Fuller two sources of error confront us. First we are apt to consider him as a clergyman who had studied medicine and who was not a regularly educated physician, and secondly the too commonly accepted belief that superstition, astrology and ignorance predominated at that time. Now as to the first it can be positively said that while he was well educated in clerical matters, his profession was medicine, and it was as physician and not as minister that he came to America. There is perhaps no stronger proof of this than the words of Pastor Robinson in his final letter to his brother-in-law, John Carver, just before the Mayflower sailed (July 27, 1620). He says: " ". . . I have written a large letter to ye whole, and am sorrie I shall not rather speak than write to them, & the more considering ye want of a preacher, which I shall also make sume spurr to my hastening after you. . . ." In the list of the passengers sailing on the Mayflower the occupation of Samuel Fuller is given as Physician, and " the vocations given were, as far as ascertained, the callings the individuals who represented them had followed before taking ship." " Dr. Thacher in his memoirs says: " " The first physician of whom we have any account among the Colonists was Dr. Samuel Fuller. . . . Whether he had enjoyed a collegiate education is uncertain, but he is said to have been well qualified in his profession; he was zealous in the cause of religion, and eminently useful as a physician and surgeon." An account of the sickness in Governor Endicott's Settlement at Salem in 1628 says: " " Having no physician among themselves, it was fortunate for those planters that Plymouth could supply them with one so well qualified as Dr. Fuller." From these accounts as well as the numerous evidences of his learning and skill found in his life and labors in this country, it must be acknowledged that Dr. Samuel Fuller was a worthy representative of the medical profession of that period.

Previous to the coming of the Mayflower, Dr. Wotton (1606), Dr. Russell (1607) and Dr. Bagnall (1608) had accompanied expeditions to Virginia, and served as surgeon to Captain John Smith's party. History does not record how long they remained in this country. That none of them settled here would seem positive from the account given by Smith, who says " that he was compelled to return to Europe for the recovery of his health in 1609 after being badly wounded by the explosion of gunpowder, as there was neither chirurgeon nor chirurgery at the fort. In 1610 Dr. Bohun came to this country, and in 1611 he accompanied Lord Delaware to the West Indies. He was killed in a fight with a Spanish warship. It has been said that the Mayflower had a surgeon (Giles Heale), but nothing is recorded about him other than his signature to William Mullins' will. Mullins died February, 1621, on the Mayflower. There is no other mention of this surgeon either as a passenger or sailor on board the Mayflower. Therefore I think that it can be positively said that Dr. Samuel Fuller was the first physician to settle in the colonies and the pioneer English-speaking physician of this country.

As to the mental outfit of the early colonists much might be said, praiseworthy and otherwise. Astrology was the science that touched the popular imagination. Medicines were given when the moon was in the proper sign; horoscopic diagnoses were common practices; weaning of infants on the proper sign of the zodiac was the rule, all remnants of the influences surviving from the Middle Ages. Superstition had its believers even among the educated, yet the very influences thought to be the greatest hindrance to advancement, namely, the lack of opportunities for book learning, the absence of newspapers, periodicals and journals to spread the knowledge gained as well as the exigent wants of the people, were all factors in compelling close observation in their new surroundings, and a keen stimulant to the desire for schools and churches upon which to build a government indestructible. That Doctor Fuller was one of those equipped with the mental training suitable to enable him to make the best of his new environment must be admitted. In a time when the very suspicion of possessing medical skill made it dangerous to be thus recognized it speaks strongly of Dr. Fuller's courage and high-mindedness to be looked upon as the one person best qualified in the knowledge of medicine. A small ship of about 60 tons was fitted out in Holland and was to accompany the Mayflower to this country. Dr. Fuller was evidently not a passenger on this ill-fated ship, for an account of the sailing (about July 22, 1620) says: " " just who of the Leyden chiefs caused themselves to be assigned to the small vessel (Speedwell) to encourage its cowardly Weston cannot be definitely known. It may be confidently assumed, however, that Dr. Samuel Fuller the physician of the colonists was transferred to the Mayflower upon which were embarked 3/4ths of the entire company, including most of the women and children, with some of whom it was evident his services would be certainly in demand." There appears to have been very little sickness, other than seasickness, among the passengers during that long and trying voyage. One of the seamen, an able-bodied man much given to profanity, was stricken with a " grieveous disease of which he dyed in a desperate manner, and was ye first yt was throwne overboard." " Whether this was a case of delirium tremens " no positive knowledge exists. Two weeks later on the day before land was sighted the second death occurred. This was William

Butten, the servant-student to Dr. Fuller, and he was the only passenger who died on the voyage. Dr. Fuller, unlike all the other leaders, did not bring his wife and family with him. His only attendant was the youth Butten who is designated in the Log Book as "servant-assistant to Dr. Fuller." The fact that there was very little sickness on the Mayflower speaks well for the physical condition of the party, which is said by Winslow "to be the youngest and strongest of the Leyden congregation." That there were troubles other than sicknesses against which the leaders had to contend would appear from the following: "This day before we came to harbor observing some not well affected to unity and concord, but gave some appearance of faction, it was thought good there should be an association and agreement that we should combine together in one body, and to submit to such government and Governors as we should, by common consent, agree to make and choose, and set our hands to this that follows word for word."[1] This dissatisfaction arose on account of the abandonment of the location for settlement on territory under the protection of the patent granted by the London Virginia Company. Consequently on the 11th day of November, 1620, all the adult male passengers except two seamen, and those too ill, met in the cabin of the Mayflower and there drew up and signed the famous compact, a basis of civil self-government fame of which will never die. Samuel Fuller was the eighth signer of this memorable declaration. He was preceded in order by, first, John Carver; second, William Bradford, the leader and guide; third, Edward Winslow, the diplomat; fourth, William Brewster, the elder and scholar; fifth, Isaac Allerton, the active, progressive business man; sixth, Miles Standish, the Cincinnatus of the colony; seventh, Pilgrim John Alden, the young enthusiast.

Previous to sighting land Mistress Elizabeth Hopkins, wife of Master Stephen Hopkins, was delivered of a son, who, on account of the circumstances of his birth was named Oceanus, the first birth aboard the ship during the voyage. Later (November 27, 1620), Mistress White, sister to Dr. Fuller, gave birth to a son which is called Peregrine, the first child born in Cape Cod Harbor,[2] and the first-born English child in New England. There was another birth on the Mayflower December 22, 1620, while in Plymouth Harbor, son of Isaac Allerton, dead-born,[3] mother died February 25, 1621.

Scarcely had the Mayflower anchored in Cape Cod Harbor before sickness and death began their cruel work. Including the thirty-five days' stay in Cape Cod Harbor the voyagers had been one hundred and two days in coming from Plymouth, England, to Plymouth (New England), or one hundred and forty-five days from London. The condition of the Pilgrims did not improve after reaching Plymouth; their sickness and mortality can be best appreciated from Bradford's account; he says:[4] "But that which was most sadd & lamentable was, that in 2 or 3 moneths time halfe of their company dyed, espetialy in Jan: & February, being ye depth of winter, and wanting houses and other comforts; being infected with ye scurvie & other diseases, which this long vioyage & their inacomodate condition had brought upon them; so as ther dyed sometimes 2 or 3 of a day in ye foresaid time; that of 100 & odd persons scarce 50, remained. And of these in ye time of most distress, ther was but 6 or 7 sound persons who, to their great commendation be it spoken, spared no pains, night nor day, but with abundance of toyle and hazard of their own health, fetched them woode, made them fires, drest them meat, made their beads, washed their lothsome cloathes, cloathed & uncloathed them; in a word did all ye homly & necessarie offices for them wch deinty & quesie stomacks cannot endure to hear named."

Many guesses have been ventured as to the exact nature of this first illness. The overcrowding, the under-feeding, the trials, hardships and anxieties of the long voyage might be as favorable to the inception and development of one disease as another. There is every reason to believe that no infectious disease prevailed during the voyage. The only deaths were those of the seaman and William Butten, Doctor Fuller's assistant.

On November 11/21 a party of fifteen or sixteen men went ashore. On the 13/23 "many went ashore to refresh themselves, and the women to wash." An exploring party left on November 15/25, and was gone two days, during which time they followed Indians ten miles, found a store of buried corn and a big ship's kettle which they brought to ship. November 19/29 seamen went ashore. During all these trips it was necessary to wade in icy water up to the hips, and many are reported as having taken colds and coughs.

November 27/December 7, a party of twenty-four passengers, nine of the crew and the master of the ship, set out for land and a snow storm of six inches in depth forced them to remain on shore. They brought back corn, baskets, pottery, wickerware, etc., which they found buried in two graves and Indian houses.

December 4/14, the first death occurred, 17 days since the corn, kettle, etc., were brought on board. There were three deaths from illnesses as well as the death from drowning of Mistress Dorothy Bradford (December 7/17) during the thirty-five days the Mayflower lay in Cape Cod Harbor. The Mayflower reached Plymouth December 17/27, many reported sick, one of the Leyden party died December 21/31, another December 24/January 3. December 28/January 7, "Many ill from exposure." January 1/11, 1621, a death on Mayflower. January 8/18, another death. January 11/21, many ill aboard, Bradford and Carver ill on shore. On December 25, 1620 (January 4, 1621), the first house was started. It was about 20 feet square, and was a common rendezvous. It was principally used for the sick, and may be well considered to be the first hospital erected in this country. From this time the general sickness increased; there were 8 deaths during January, 17 during February, 13 during March, and 6 for the rest of the year. That the sickness was brought to the ship from shore would appear from Bradford's account, February 27/March 9: "The sickness and deaths of the colonists on shore have steadily increased, and have extended to the ship, which has lost several of its petty officers, including the master gunner, three quartermasters and cook,

and a third of the crew, many from scurvy." February 28/March 10, he says: "The fifty-third day the ship has lain in this harbor (Plymouth), and from the present rate of sickness and death aboard, no present capacity or prospect of getting away, those better being yet weak." March 24/April 3, "Many still sick, more on the ship than on shore." From this account it would appear that the sickness was of an acute, highly contagious nature, that it did not manifest itself until the passengers had gone ashore, drank the water, and brought corn and utensils from the Indian camps; that the sailors did not become ill until some of them had gone on the exploration with the passengers. Assuming the disease to be other than acute tuberculosis, which has been claimed to be the cause,[25] it must have been a disease whose period of incubation was from ten to twenty days. Scurvy we know existed, also acute coughs and colds, due to wetting and exposure, but Dr. Fuller, Bradford, Winslow and others, as well as the seamen, were well acquainted with the course of scurvy and would not fear it. It is not contagious, and there is little in the course of scurvy to suggest disgust in nursing the same. An argument against tuberculosis would appear from the fact that many recovered but were quite weak for some time, i. e., a slow convalescence. It is well established that the country about Massachusetts Bay had been swept by an epidemic of a very infectious disease two years before the landing of the Pilgrims. What that disease was can only be conjectured. Also in 1616 there had been a pestilence among the Indians which was thought to be either plague or smallpox, but which did not affect the English, although they lived and slept in the same cabins with the Indians.[26] Smallpox had been introduced into this country by the Spaniards in the early part of the sixteenth century."

From the description gathered principally from Bradford's and Winslow's writings, as well as the history and course of the epidemic later at Salem, Charlestown and Dorchester, it would seem that the disease which caused the greatest mortality among the first settlers was either smallpox or typhus fever (plague), or a virulent form of typhoid. That there were cases of consumption, pneumonia, rheumatism and scurvy seems most natural under the circumstances. The most we know of the course of the sickness is that Bradford was reported very ill on January 11, 1621, and when he was elected as second Governor of Plymouth Colony in April, 1621, he was still too ill to take up the duties of the office. It is also known that the epidemic of sickness in 1634 was smallpox[27] and was fatal to many who had been exposed to the sickness in 1621. It is interesting to note that even at this early date consumption was considered a communicable disease. Frescatorius (1483-1553), who was the first to publish a description of typhus fever, says:[28] "Consumption is contagious, and is contracted by living with a phthisical person, by the gliding of the corrupted and putrefied juices (of the sick) into the lungs of the sound man." Measles and smallpox had been known from the middle of the ninth century.[29] From the knowledge which we possess of Dr. Fuller's education it is not unreasonable to assume that he was familiar with the writings and medical discoveries of the old writers. At London, and more especially at Leyden, he had every facility to consult their works. There is positive evidence that Doctor Fuller practiced bleeding, which was so universally employed at the beginning of the seventeenth century. Fuller did not limit his services to the settlers at New Plymouth. We find him dressing the wounds and curing the injuries of the Indians against whom Captain Standish proceeded in 1621. Also in 1622 upon the arrival of the Weston colonists, whom the Plymouth settlers had every reason to dislike, the sick and lame among them were left at Plymouth by permission of the Governor, although they had a surgeon in their party (Mr. Salisbury),[30] until their health was restored by Doctor Fuller, which he did without pay.[31] The wife and daughter of Samuel Fuller were passengers on the Anne in 1623. Two children were born in this country, Mercy, and Samuel who in 1694 was the first minister in Plymouth church. He had seven children, one of whom, Isaac, was the first physician in Middleboro. There is little to relate in the history of the Colony during the years 1623-1627. More or less sickness prevailed, yet there was no special epidemic. One event is recorded which shows that Doctor Fuller possessed a heart which was most tender and charitable towards his fellowmen. A certain Mr. Lyford came to the Colony in 1624 in the guise of a minister, but who in reality was a hypocrite and traitor. His scheming was frustrated and he was confronted with the evidence of his duplicity. At first he denied the charges, but later publicly confessed his sins in the church, and so great and sincere was the appearance of his repentance "that Samuel Fuller and some other tender-hearted men were so taken with his signs of sorrow and repentance, as they professed they would fall upon their knees to have his censure released."[32] Fuller's charity was misplaced, for Lyford's reformation did not last two months. In the affairs of trade and government of the Colonists, Doctor Fuller, although one of Governor Bradford's councillors, appears to have taken little part. He gave bonds with others, to the company of adventurers in England, yet he does not seem to be held by rigid demands of that bond. His mission and sacrifice were greater than that of worldly gain and his chief recompense was the love and gratitude of those who sought his sympathy and advice in their great trials, both physical and spiritual. When Bradford became Governor, Doctor Fuller was one of his selected councillors together with four others.

Doctor Fuller, unlike many of the early settlers, did not combine disputation nor bigotry with his religious views. To him a sick person was a call to duty, whether it came from Puritan or Pilgrim, Huguenot or Catholic, friend or foe, white man or Indian, all alike received the fullest measure of which he was capable. We are not surprised, therefore, to find him laboring among the Puritans of the settlements at Salem, also at Dorchester and Charlestown in 1628, '29 and '30. When Governor Endicott arrived in Salem there was much sickness of an infectious nature among the pas-

sengers. This sickness spread to those on land and many died, "Some of ye scurvie, other of an infectious feavure, which continued some time amongst them (though our people (the Plymouth settlement) escaped it." Endicott wrote to Governor Bradford begging the services of Doctor Fuller whom he had heard had "cured diverse of ye scurvie, and others of other diseases by letting blood, & other means." In view of the strained relationship which existed between the Pilgrims and Puritans up to this time Doctor Fuller's visit had an important bearing upon the affairs of the whole Colony. Governor Endicott wrote Governor Bradford, "I acknowledge myself much bound to you for your kind love and care in sending Mr. Fuller among us, and rejoice much that I am by him satisfied touching your judgments of the outward form of God's worship. It is as far as I can gather, no other than is warranted by the evidence of truth, and the same which I have professed and maintained ever since the Lord in mercy revealed Himself unto me, being far from the common report that has been spread of you touching that particular."[34]

From this letter it is evident that Doctor Fuller improved his opportunities and fully converted Governor Endicott from the prejudices and jealousies which he held concerning the Plymouth Settlement. It is worthy of note that Mrs. Endicott died during one of these visits of Doctor Fuller. Governor Winthrop's settlers shared the fate of all the other expeditions to the Colonies, and so great was the sickness among them at Charlestown that Doctor Fuller was requested to aid them in their distress, which he promptly did, rendering good assistance and earning the thanks of Governor Winthrop and his Colony.

In June, 1630, Doctor Fuller wrote:[35] "I have been to Matapan (now Dorchester) and let some twenty of those people blood." Again, in August, 1630, while at Charlestown he writes:[36] "There is come hither a ship (with cattle and more passengers) on Saturday last which brings this news out of England; that the plague is sore, both in the city and country, also there is like to be a good dearth in the land by reason of the dry season—the sad news here is that many are sick and many are dead—I here but lose time and long to be at home. I can do them no good, for I want drugs and things fitting to work with." In these letters we find positive proof that Doctor Fuller knew that the infectious nature of the disease called for other remedies than bleeding. Much surprise and confusion has been manifested by many writers over the fact that Doctor Fuller bled the sick people of that period, yet bleeding was a well authorized treatment for typhus fever during the seventeenth century,[37] a fact which strongly suggests the sickness prevailing.

Governor Endicott in his memoirs[38] says: "Such was the great mortality among them (Endicott's party) during this first winter after their arrival arising from the rigors of untried climate, and their being badly fit and badly lodged that there were scarcely found in the settlement well persons enough to nurse and console the sick—to enhance their distress they were destitute of any regular medical assistance."

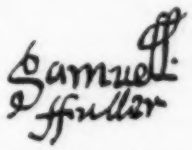
Doctor Fuller was a man of keen observation and good reasoning. In writing to Governor Bradford while he was yet among the people at Dorchester (1630) he says: "I have had conferences with them all till I was weary. The Governor (Endicott) is a goodly wise and humble gentleman and very discreet, and of a firm and good temper. We have some privy enemies in the bay but (blessed be God) more friends,—the Governor had conference with me, both in private and before sundrie others—the Governor told me he hoped we will not be wanting in helping them, so that I think you will be sent for."[39] The great influence which these visits of Doctor Fuller to the Endicott Settlement had upon the affairs of the early progress of this country has never been fully set forth. There had been much disappointment in England over the result of the enterprise sent out here. Those who had backed the venture financially had received little or no return. The meagre exports from this country had been seized. Enemies had circulated many discouraging rumors in England concerning the objects and doings of the planters in New England. Winslow, Allerton and Standish had made repeated trips to England for support, but with little success. The Indians were being incited to hostilities, and finally the arrival of the Endicott party who brought with them prejudices and unfriendliness towards the Plymouth settlers. After Fuller had gone among them on his visit of mercy and help, all this changed. Endicott sent back to England a report setting forth in most favorable terms the state of affairs here, as well as a glowing account of the climate, the country and its resources. The result was a changed sentiment in England, an increased confidence in the Plymouth settlers and the active co-operation at home of men of wealth and position with a greater disposition towards emigration to this country, and consequently a rapid, vigorous growth of many new colonies which meant the complete success and permanency of the settlement in the new world. His successors in the healing art, if none others, might well provide a suitable memorial of this good physician's visits of mercy to the pestilent-stricken settlers of infant Salem, Dorchester and Boston.

In the epidemic of smallpox which prevailed in 1633 many fell very sick, and about twenty died, men, women and children, including many of the old settlers from Holland, among whom was Samuel Fuller (after he had much helped others) and "had been a great help and comforte unto them; as in his faculties, so otherwise, being a deacon in ye church, a man godly, and forward to doe good, being much missed after his death; and he and ye rest of their brethren much lemented by them, and caused much sadness & mourning amongst them."[40] This disease was also very fatal among the Indians from all the adjoining places. A curious fact in relation to this epidemic was that it had been prophesied by the Indians in May on account of the great quantities of a sort of fly, about the size of wasps or bumble bees, which came out of holes in the ground, and filled the woods, eating the green things and making a constant yelling noise, deafening to hear. These insects (locusts?) were unknown to the English. The epidemic followed in June, July and August

during the heat of summer. Notwithstanding the many trials, hardships and toils to which a physician is subjected even in these days of conveniences and luxuries, it is both gratifying and significant to find this early physician acting as the guardian of the future welfare of the community by perpetuating learning among its children. In his will he mentions four youths entrusted to his care who were to be returned to their parents at Charlestown and Dorchester. This will, both on account of the fact that it is the first will probated in this country as well as the many points mentioned therein touching the life, work and character of Doctor Fuller is here abstracted as follows: "

"I Samuel Fuller the Elder being sick & weake, but by the mercie of God in pfect memory ordaine this my last will and testmt. I doe bequeath the Education of my children to my Brother Will Wright & his wife, onely that my daughter Mercy be & remaine to good-wife Wallen so long as she will keepe her at a reasonable charge. But if it shall please God to recover my wife out of her weake state of sickness then my children to be with her or disposed by her. I desire my Brother Wright may have the bringing up of a childe comitted to my charge, called Sarah Converse, but if he refuse then I comend her to my loving neighbor and brother in Christ Thomas Prince.

"Item. Whereas Eliz. Cowles was submitted to my educacion by her father and mother still living at Charlestowne, my will is that she conveniently appelled & returne to her ffather or mother. And for George ffoster being placed wth me by his parents still living at Sagos, my will is that he be restored to his mother. Item. I give to my son Samuel my house and land at the Smelt river; I order certain portions of my estate (naming them) to be sold to educate my two children Samuel & Mercy. I give land adjoining Mr. Isaac Allerton's to my son Samuel and also land on Strawbury hill given to me by Edward Bircher, if Mr. Roger Williams refuse to accept it as he has formerly done. Item. My will is that my cozen Samuel, goe away with his stock of cattle and swine without any further recconing. Item. My Estates, and cattle with my two servants Thomas Symons & Rob't Cowles be employed for the good of my two children, by my Brother Wright and Priscilla his wife. I give to the church of God at Plymouth the first cow calfe that my brown cow shall have. I give to my sister Alice Bradford twelve shillings to buy her a pair of gloves. Whatever is due to me from Capt. Standish I give unto his children. Item. That a paire of gloves of 5sh be bestowed on Mr. Jno. Winthrop Gov. of the Massachusetts. Item. Whereas Capt. John Endicott oweth me two pounds of Beaver, I give it to his sonne. It. My will is that my children be ruled by my overseers in marriage. It. I give unto John, Jenny & Joh. Winslow each of them a pair of gloves of five shillings. It. I give unto Mr. Heeke, the full sum of twenty shillings. I give unto Mr. William Brewster my best hat and band wch I never wore. I give to Rebecca Prince 2 sch 6d to buy her a pair of gloves. My will is that in case my son Samuel die before he come into inheritance of my estate then they are to go to my kinsman Samuel Fuller now in the house with me. I appoint my son Samuel my executor, and Mr. Edward Winslow, Mr. William Bradford & Mr. Thomas Prince my overseers. To my daughter Mercy one Bible with a black cover. It. Whatsoever Mr. Roger Williams is indebted to me upon my booke for physick I fuly give him."



Fac-Simile Autograph. Very rare.

"Memoranda—Whereas the widow Ring submitted to me the oversight of her sonne Andrew my will is that Mr. Price take charge of him."

The widow of Samuel Fuller and her son Samuel joined in a gift (1644) to the church of Plymouth for the use of a minister the land (half an acre) once owned and occupied by Doctor Fuller, and upon which the parsonage house of Harvey W. Weston now stands." Mrs. Fuller is mentioned as one of the earliest women practitioners of midwifery in this country. The town records of Rehoboth, Massachusetts, July 3, 1663, says, "Voted, and agreed that—Mrs. Bridget Fuller of Plymouth should be sent to, to see if she be willing to come and dwell among us to attend on the office of midwife, to answer the town's necessity, which at present is great." This invitation was not accepted, as she died at Plymouth the next year." Her son Samuel was offered the call to the church at Rehoboth at the same time. The son Samuel became a clergyman and was the first minister of the church at Middleboro, Massachusetts. He married a granddaughter of Elder Brewster." His daughter Mercy married Ralp James.

On the death of Doctor Fuller an early writer" says: "In his medical character, and for his christian virtues and unfeigned piety Dr. Fuller was held in the highest estimation, and was resorted to as a father and wise counselor during the perils of his day. He was finally one of the several heads of families who died of a fever which prevailed in Plymouth in the summer of 1633, and was most deeply lamented by all the colonists."

Doctor Fuller's library contained only twenty-seven books, among which are mentioned two dictionaries and "Peter Martyr on Rome." It is safe to suppose that the well-stocked libraries of Brewster, Winslow and Bradford were freely open to the use of Doctor Fuller. Although medical literature must have been very scarce in those days, the physical endurance required for a day's labor was hardly calculated to encourage much leisure reading. Meagre as were the literary advantages of the early colonists, one of the most prominent characteristi of the people was the solicitude for the education of the children. New England's first fruits published in London in 1643 says: "One of the next things we longed for, and looked after, was to advance learning and perpetuate it to Posterity." " It is to this spirit that the founding of Harvard College at such an early period (1638) can be ascribed, a movement in which Samuel Fuller must have been an early and important factor. In this connection it may be said that the influence which Doctor Fuller had exercised for the cause of education was continued by his good wife, and the

first court record which alludes to schools in this country says that it was ordered by the court in 1635 "that Benjamine Eaton (a lad 8 years old) with his mother's consent, is put to Bridget Fuller, being to keep him at school for two years, and employ him after in such service as she saw fit, and he shall be fit for." " Modernity is apt to lay claim to all that is good and noble in the many walks of life, forgetful of the many hardships, sacrifices and trials which have been endured and overcome in its completion. Let us hope that the one profession above all others whose whole life is one of self-sacrifice and charity will not be unmindful of the good work of its pioneers.

History affords fewer examples more worthy of honoring or more creditably representing the self-sacrificing, broad-minded, truly charitable Christian physician than the life practiced by Doctor Samuel Fuller among the first settlers in this country. How fittingly apply the words of the Master, "Greater love hath no man than this, that a man lay down his life for his friends."

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THE RELATION OF THE STATUS LYMPHATICUS TO SUDDEN DEATH, DEATH UNDER ANÆSTHESIA, AND INFECTION.

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INTRODUCTION.

There is probably no form of sudden death which has received so much attention from the medical profession in recent years as that form associated with the hyperplasia of the thymus gland and the lymphatic apparatus in general, known as the "status lymphaticus." At the same time that discussion regarding *spontaneous* sudden death in this condition has been going on, a few articles have called attention to the similarity which exists between the lesions of this form of spontaneous sudden death, and many cases of death under anæsthesia, and an occasional article also has suggested

a relationship between sudden death during infectious diseases and the status lymphaticus.

All three classes of cases are of interest to the physician both from a purely professional and from a medico-legal point of view. From a professional standpoint it is of the greatest importance that we should recognize the existence of a class of individuals, the subjects of a peculiar constitution which renders them extremely susceptible to shocks of various kinds, physical, psychical, and toxic, and which may lead to their sudden death from accidents which to the ordinary individual would be trivial. In considering this aspect of these cases we need only recall the instances where death has followed some trivial shock, or as trifling an operation as the hypodermic administration of a standard remedial agent. Instances are on record where individuals who were subjects of this constitution have died from the shock of a plunge into cold water, and the case of Prof. Langerhans' child, who died a few minutes after the administration of antitoxine, is familiar to many medical men. The medico-legal aspect of these cases bears mainly upon sudden death in apparently healthy infants where a suspicion of foul play is entertained. A number of cases are on record where nurse maids, or relatives, have been accused of suffocating or fatally maltreating infants, the true cause of death being shown by the autopsy to be the status lymphaticus.

Aside from the relation of the status lymphaticus to the class of cases above enumerated, certain authors have called attention to its rather frequent coexistence with other diseases, notably with rachitis, epilepsy, and exophthalmic goitre. It is not the purpose of this paper to discuss the relationship between these conditions and the status lymphaticus further than to state that *such a relationship is by no means constant*. While we admit the relatively frequent association, and even believe that the status lymphaticus may modify the course of these diseases when associated with them, we can see no evidence which proves that these diseases are dependent on changes in the thymus or lymphatic apparatus, and we regard the coexistence as merely a coincidence.

The object of this paper, as expressed by its title, is to endeavor to show the common factor which underlies cases of sudden death associated with the "status lymphaticus" whether these occur spontaneously, or under the influence of a chemical (anæsthesia) or bacterial (infection) poison. We might add that we deem it probable that the same common factor underlies cases of epilepsy or exophthalmic goitre associated with the status lymphaticus, but this is merely an assumption on our part, as we have had no personal experience with such cases.

The views which are here set forth are based upon the study of nine cases of sudden death occurring in infancy and childhood, and upon the study of the available literature. We would point out in passing that, in our opinion, the great weakness of most of the articles on the subject lies in the almost total failure to consider the histology and bacteriology of the condition, subjects which are briefly touched on in some reports, and which we aim to treat more fully. Inasmuch as the pathological anatomy and histology are essentially the same in all classes of cases we shall consider the clinical features first, next discuss the pathology, and finally consider the theories regarding the import and significance of the status lymphaticus.

Clinical Considerations.

Spontaneous sudden death associated with the status lymphaticus.

General Considerations.—The association of sudden death with enlargement of the thymus was noted as long ago as 1723 by Bichat, but the subject was not brought into prominence until 1829, when Kopp emphasized it, and also drew attention to the so-called thymic asthma. Friedleben's monograph in 1858 threw doubt upon the relation of enlarged thymus to sudden death, and the subject remained quiescent until 1888, when the work of Grawitz in Germany and Jacobi in this country revived it. The recognition of the fact that the enlarged thymus is merely part of a general hyperplasia of the lymphatic apparatus we owe to the Vienna school, and particularly to Paltauf. In some cases, and particularly in adults, the lymphatic hyperplasia is associated with a hypoplasia of the heart and aorta, similar to that described by Virchow in chlorotic subjects, so that in connection with these cases Paltauf speaks of the chlorolymphatic constitution.

Before describing the various clinical pictures which immediately precede the death of these patients, it may be well to consider whether it is possible to make a diagnosis of the status lymphaticus before the onset of the attack which is the immediate cause of death. Certain clinicians, and particularly those of the Vienna school, believe that individuals who are the subjects of the lymphatic constitution can in many cases be recognized. Escherich, who has studied these cases carefully, states that they usually have a pale, thin skin, a pasty complexion, and a good pad of subcutaneous fat. Frequently signs of rachitis or scrofula are present. The superficial lymph glands, especially those of the neck and axilla, are enlarged. There is hypertrophy of the tonsils, the circumvallate papillæ of the tongue, and the pharyngeal lymphatic apparatus (adenoids). The spleen is often palpable. Daut adds that a percussable thymus may develop later, and Ewing's work strongly suggests that an increase in the lymphocytes of the blood is in all likelihood present.

Unfortunately up to the present time our knowledge of the clinical symptoms of these cases relates mainly to the appearances observed immediately or shortly before the death of the patient, and this is almost of necessity the case, inasmuch as the majority of these patients are apparently in perfect health up to within a short time of the fatal issue. The clinical picture varies in different cases, and we shall attempt to classify the cases according to the clinical features, though the immediate causes of death are probably only two, cardiac paralysis and asphyxia.

Cases found dead in bed.—A number of our cases, and of the cases in the literature, come under this heading. This type of death usually occurs in young infants, and most of the cases in which foul play has been suspected are of this nature. It is a question whether many of the cases of "overlying" of infants would not be found to be instances of death from status lymphaticus if investigated. The manner of death in these cases is of necessity uncertain; at the same time there are grounds for believing that the infants are not perfectly well for a short time, perhaps some hours, before death, and probably death takes place in a convulsive seizure. In some of our cases of this character, which occurred in St. Margaret's House under Dr. H. L. K. Shaw, the records show that the children refused food sometimes as long as an hour before they were found dead, which is presumable evidence that they did not feel well. A death in convulsions is also suggested by the history of some of these cases, of which the following case, which occurred in the practice of Dr. G. Emory Lochner, is an example.

The mother of an apparently healthy female child, ten months of age, was in the habit of putting her to sleep in a baby carriage on the veranda while she attended to her household duties. On March 16, 1903, she followed her usual custom. Whilst working near an open window in the neighborhood of the baby carriage she heard the child move, and looking out at her saw her struggling. Thinking that she was merely struggling in her sleep she avoided going very close to her, but on returning and looking at the child a few minutes later she found her head.

Cases of sudden death presumably of cardiac origin.—Under this head we may reasonably place cases where the death was very sudden and not preceded by respiratory disturbances. In all probability cases reported by Nordmann and others, where sudden immersion in cold water was followed by instant death, belong to this class. It is questionable whether some of the cases found dead in bed should not also come under this heading.

Cases of sudden death, presumably of respiratory origin.—Most of the cases of sudden death in status lymphaticus with symptoms of respiratory difficulty may be classed under the general heading of thymic asthma. There is no doubt that this condition has been confounded by some observers with ordinary laryngismus stridulus, but the majority of clinicians who have studied the two conditions in recent years agree that there is no relation between the two diseases. Lange states that the paroxysm in thymic asthma differs from that in laryngismus stridulus in that regular sighing respiration is present throughout the attack in the former condition. The history of one of our cases tends to show that this is not necessarily so. The cases of thymic asthma do not all present the same clinical picture; in some instances the child dies in the first attack or series of attacks, whilst in other cases the condition may last for a week or even years and finally terminate in a fatal attack or relief by operation. The operative procedures thus far resorted to in these cases have been total extirpation of the gland or partial extirpation and pulling upward of the gland, the portion left being anchored to the sternum high up. The following case, which occurred in the service of Dr. W. H. Happel in the Albany Hospital, well illustrates the form of thymic asthma which is rapidly fatal. I quote from Dr. Happel's history:

A male child, apparently healthy and weighing 6½ pounds at birth, continued to gain weight up to the 14th day of his life. On the morning of the 14th day it was noted that he had made no gain in weight but seemed otherwise well. At 4 p. m. he was found cyanosed at his mother's breast. He was unconscious, with crowing inspiration. The reflexes were abolished. The pulse was slow and gradually became slower. The inspiration became quicker and shorter, and then both pulse and respiration ceased. The child became rigid, cyanotic and pale. The thorax was arrested during inspiration. The child became limp. After about thirty seconds a loud inspiratory shriek ushered in the respiration and the heart beats completing a marked attack of laryngismus stridulus. The attacks were repeated several times, the child never becoming conscious in the intervals. Death occurred seven hours after the onset of the first attack. From the presence of a percussable dullness over the manubrium Dr. Happel made a diagnosis of thymic hyperplasia with status lymphaticus, which was confirmed at autopsy.

These cases in which the child dies during an acute attack after a few hours, or even in the first attack, are much more common than the cases running a more protracted course. We cite the clinical history of a chronic case from Purrucker:

An otherwise healthy child, 2½ years of age, with no signs of rickets, and no palpable glandular enlargements, had suffered from difficulty in breathing since the age of two weeks. There was a gradually increasing inspiratory dyspnœa with sudden attacks of greater severity, and the parents feared sudden death from asphyxia. When the child was quiet it breathed slowly and noisily. The noise was louder on lying down than when the child was sitting up. There was no cyanosis. Psychic disturbances increased the dyspnœa. Purrucker describes the clinical picture as being typical of the stridor of infants. Operation was finally decided on and an enlarged thymus was removed without difficulty, the child making a prompt and satisfactory recovery and the symptoms disappearing.

Some cases of death in status lymphaticus die with signs of suffocation and without definite asthmatic seizures. Such cases are described by Gerhardt and also by Somma. The child presents accelerated respiration, an access of suffocation, cyanosis, dilatation of the pupils, swelling of the veins in the neck, and death occurs in a few minutes.

Cases of sudden death, presumably of nervous origin.—The occasional association of the status lymphaticus with epilepsy has already been briefly referred to. Ohlmacher has called attention to the resemblance between the attacks in the two conditions. While we have no cases to report of this association of conditions, we would point out that the manner of death in some of the reported cases of status lymphaticus resembles the type of death associated with lesions of the central nervous system rather than that due primarily to

cardiac or respiratory failure. Some of the cases reported have died very suddenly during a spasm which by some writers has been described as epileptiform.

Laub has described cases of what he calls the cerebral form of death from status lymphaticus. This form differs from the ordinary form in several particulars. It usually occurs in young adults and causes death in a few hours, eighteen at the outside. The individual is attacked suddenly with coma or perhaps epileptiform convulsions. Sometimes cramp of the glottis occurs, or vomiting of a cerebral type. The urine usually contains albumen but no casts. The post-mortem picture is the ordinary one of the status lymphaticus plus cerebral œdema. Laub considers that these cases differ from the ordinary ones in their slower development, this allowing time enough for the occurrence of cerebral œdema and the resulting nervous phenomena.

The Relation of the Status Lymphaticus to Death During Anæsthesia.

Within the last few years attention has been called to the relation of the status lymphaticus to deaths during or soon after the administration of an anæsthetic. In Europe, Bayer, v. Kundrat and Ploc have especially noted this phase of the subject, and in this country Hinkel, and more recently Blake have emphasized it. Almost all observers agree that in these cases death is due to *cardiac* failure, and most of the case histories show plainly that respiration persists after the heart has stopped beating. In some cases premonitory symptoms in the form of pallor, dilation of the pupils, weakening of the pulse and shallow respiration are observed, but in many instances death is instantaneous. It was thought by the earlier writers that chloroform was especially dangerous as an anæsthetic in these cases, but in recent years it has been shown that deaths have also occurred under ether, and the A. C. E. mixture of Billroth. The fact that chloroform was at first regarded as unusually dangerous was no doubt due to the fact that the earlier cases were reported from Europe, where this anæsthetic is largely used. Blake's cases show plainly that ether is also dangerous. The reported deaths under anæsthesia have occurred at all ages, and bear no particular relation to sex as far as can be judged. When we come to consider whether deaths from anæsthesia associated with the status lymphaticus bear a relation to any particular disease or diseases it would seem as though two classes of patients are especially liable to this accident, patients with goitre, either simple or exophthalmic, and patients with adenoid vegetations.

The Relation of the Status Lymphaticus to Infection.

There is very little in the literature bearing directly on this phase of the subject. Paltauf suggests that the real cause of death in some of the cases supposed to have died in status lymphaticus was capillary bronchitis, but our cases, which were controlled by histological and bacteriological examinations, do not support this view. Daut has published an interesting series of cases from Escherich's clinic, in which he discusses the effect of the status lymphaticus on diphtheria. He found that over a quarter of the patients dying from diphtheria presented the picture of the status lymphaticus. Distinct modifications of the clinical picture of the disease were present in these cases. In some instances the patients had a hoarse barking cough and a hoarse voice, associated with attacks of spasmodic suffocation, weakness of the heart, and rapidity of the pulse. These attacks were altogether out of proportion to the severity of the membrane formation as shown post mortem. In other cases the patient died suddenly, having shown no unusual symptoms during life referable to the status lymphaticus. In this connection we give the clinical histories of two of our cases which show that the status lymphaticus may mask or modify other infections.

(1) *Tetanus modified by the status lymphaticus.*—The patient was a case of Dr. W. O. Stillman.

The patient, a boy of 12 years, accidently wounded himself on the inside of one of the fingers of the right hand while discharging a toy pistol July 3, 1900. The wound was a very slight one and attracted but little attention. It was treated with ordinary home remedies and appeared to be doing fairly well, although there was a very slight discharge from it. The patient remained in good health until Friday, July 6, when he complained of headache, chilliness, general malaise and sore throat. He was seen on Friday evening by a physician who administered some palliative remedies. The patient had a very restless night Friday night, complained of most intense headache, pain in the back of his neck, as well as general aching through the muscles of the back, arms and legs. The temperature on Friday was somewhat elevated, between F. 100° and 101°. On Saturday morning the patient appeared to be somewhat worse, the temperature was in the vicinity of F. 101°, the throat was quite sore and the tonsils decidedly swollen. The headache and other pains were about the same. The case was regarded as one of tonsilitis and treated as such. The patient's symptoms became somewhat worse during the day on Saturday and he passed an extremely restless and uncomfortable night Saturday night. Saturday afternoon he complained of some difficulty in opening the mouth, which at the time was attributed to the swollen tonsils. This difficulty became worse during the night, and Sunday forenoon, about 10 o'clock, all of the patient's symptoms having become decidedly worse, he was suddenly seized with opisthotonos, and died in a few minutes.

The autopsy was done on the morning of the following day, Monday, by Dr. Elting and showed the usual lesions of the status lymphaticus, and cover-slips from the wound of the finger showed large numbers of typical drum-stick tetanus bacilli.

(2) *Streptococcus infection modified by the status lymphaticus.*

The patient was a boy of 13 years of age with a history of never having been strong, and of showing dyspnœa on exertion since childhood. There was no history of epilepsy. He was an inmate of an orphan asylum, and apparently in his usual health until within a short time of his death. On the day of his death he suddenly became cyanotic a short time after his evening meal, had one or two convulsions and died in fifteen minutes.

The autopsy showed the usual picture of the status lymphaticus with acute bronchitis and congestion of the lung. Cultures showed a general streptococcus infection.

It would seem from Daut's experience and the cases just reported that the status lymphaticus may have a distinct influence on infections, sometimes modifying their course, and sometimes masking them. Daut's experience with diphtheria shows a distinct modification of the ordinary clinical picture in some cases, and in the two cases reported by us the tetanus case showed an unusually acute course, and the case of streptococcus infection was completely masked up to the time of the patient's death.

The Pathological Anatomy of the Status Lymphaticus.

There is a general agreement among pathologists as to the gross lesions associated with the status lymphaticus. These consist, broadly speaking, of a hyperplasia of the thymus gland, and of the lymphatic tissue of the body in general. It is necessary to state, however, that the degree of hyperplasia, and also the extent of it, varies in different cases. In practically all cases the thymus is hyperplastic, but in some cases only one or two groups of glands may be affected, in others the intestinal or the splenic lymphatic apparatus may be especially involved, and in still others there may be a widespread hyperplasia of all the lymphatic tissues of the body.

Aside from these lesions of the lymphatic apparatus, which are constant, we find other lesions present with a fair degree of constancy. Hypoplasia of the vascular system, first pointed out by Paltauf, has been described more frequently in adults and children nearing puberty than in infants. In some cases compression of the trachea by the enlarged thymus has been noted, and in instances of this kind the accompaniments of asphyxia may be present in the form of subpleural and other subserous hemorrhages, and atelectatic patches in the lungs. Œdema and congestion of the lungs have also been noted in some cases. Œdema of the brain has been described by Laub. Some observers have described a lymphoid condition of the bone-marrow, and occasionally an enlarged thyroid gland has been noted.

The Histology of the Lymphatic Apparatus and Thymus in Status Lymphaticus.

The close histological study of these cases has been strangely neglected. Paltauf, and later Ewing, speak of the lesions as a simple hyperplasia. Lartigau in Blake's paper describes lesions in the spleen which he compares to the lesions found in diphtheria and other infections. The lesions which we found were constant and identical in all of the nine cases examined, though differing in degree. Briefly stated they were as follows: In the thymus gland there was a general hyperplasia of the lymphoid elements, associated at times with proliferation of the endothelial cells lying along the trabeculæ of the organ. In the lymph nodes, Malpighian corpuscles of the spleen, the tonsils, and the lymphatic apparatus of the intestine there was a general hyperplasia associated with focal changes. These focal changes occurred in the lymphatic apparatus in connection with the germinal centers, and in the spleen in the Malpighian corpuscles. The lesion in the lymph nodes, tonsils, and intestinal apparatus consisted of a proliferation of the cells composing the germinal centers, associated with slight degenerative changes in the proliferated cells. In the spleen a similar proliferative process was to be noted in the Malpighian corpuscles associated in places with a decided proliferation of the endothelial cells of the vessels of these bodies. The lesions very closely resemble those seen in various infections, and differ we believe only in degree, degenerative changes being much more marked in case of bacterial infection.

The Bacteriology of the Status Lymphaticus.

Very few statements are found in the literature regarding this point, which in view of the histological findings is a very important one. Lartigau's report in Blake's article indicates that cultures were negative in this series of cases. In our cases cultures, and in some cases cover-slips, were made, and it was found that outside of the cases definitely stated to be infected, the cultures were sterile. It is true that pus cocci were occasionally found in the lungs, and that the ubiquitous colon bacillus was also present in some cases, but we do not consider either of these findings evidence of infection; they are rather instances of agonic or post-mortem invasion. Some other factor than bacterial infection therefore must be held responsible for the lesions in most cases of the status lymphaticus.

The Causes of Death in the Status Lymphaticus.

A variety of explanations have been advanced from time to time to account for sudden death in the status lymphaticus. These explanations naturally fall under one of two heads: theories assuming that death is due to mechanical pressure of the enlarged thymus upon structures of vital importance, and theories assuming that death is due directly to cardiac paralysis, and indirectly to some form of toxæmia. We shall consider both groups of theories and their various subdivisions more or less in extenso.

The most important of the mechanical theories assumes that death is due to asphyxia from compression of the trachea by the enlarged thymus gland. This theory has developed a great deal of opposition, doubtless because many observers have never seen cases in which there was evidence of compression of the trachea. This, in fact, has been our experience, for in only one of our nine cases was there any evidence of tracheal compression, and in this case the compression was only partial and not sufficient to interfere with respiration. The supporters of the tracheal compression theory point out the very narrow space in children between the manubrium and the spinal column (2 cm.), and the fact that throwing back the head greatly increases the pressure on the trachea. The opponents of this theory emphasize the great difference between the weight of the enlarged thymus and the compressibility of the trachea. The thymus in very

few of these cases exceeds fifty grammes in weight, and according to Tamassia it takes a pressure of one hundred and eighty grammes to compress the trachea; according to Scheele seven hundred and fifty to one thousand grammes weight is needed. It seems reasonable to believe that these opposing views are largely due to diverse individual experiences, for although many of the cases show no evidence of tracheal compression, in others the evidence is very convincing. Such writers as Grawitz, Clessin and Lange have published cases in which the evidence of compression seems incontrovertible.

Other writers suggest the possibility of death being due to compression of structures other than the trachea, as the heart itself, the large vessels, or the large nerves or nerve plexuses. It is supposed that pressure on the heart might interfere with its action, and in one or two reported cases the auricles are stated to have been atrophic. The advocates of the theory that pressure on the large vessels may cause death assume that such pressure may cause a fatal anæmia of the brain. Pressure on the nerves (pneumogastric, phrenic) or nerve plexuses (cardiac, respiratory, might cause death either reflexly or by direct paralysis of the heart or lungs. With regard to all these theories we may simply state that there is practically no anatomical support for any of them, and they therefore belong in the domain of pure hypothesis.

The theory that the cause of death in the status lymphaticus may be a toxæmia was voiced by Escherich when he compared this condition with myxœdema and exophthalmic goitre. This view would assume that the process was due to an over-production of the internal secretion of the thymus. Inasmuch as the evidence in favor of the possession of an internal secretion by the thymus is contradictory in the extreme, and taking into account the histological structure of the organ, we feel somewhat skeptical as to the existence of a true internal secretion from this gland, and would suggest that it is in all probability merely a lymphatic organ. It is true that it possesses epithelial elements in the form of Hassal's corpuscles, but hardly anybody, as far as we know, has ever claimed that they are anything more than rests explicable by the mode of origin of the gland. In Blake's article Lartigau suggests a toxic origin for these cases from a study of the histological lesions, but does not state definitely what he considers the nature of the toxine to be. In connection with the toxic theory we wish to call attention to the great similarity which exists between the lesions of the status lymphaticus and the lesions described by Flexner in his paper on lymphotoxæmia. We quote from Flexner his description of the lesions produced in the guinea-pig by lymphotoxins.

"The changes in the lymph glands are diffuse, affecting the cortical nodes and the medullary strands of lymphatic tissue. The most striking alteration is found in the germinal centers and consists of increased swelling, and, to a small extent degeneration of the large cells composing these areas. The enlargement of the centers is accompanied by a general lymphoid cell hyperplasia. Mitoses in the clear cells occur but some of the figures undergo subsequent degeneration. The chief form of cellular degeneration is that attended by vacuolization and fragmentation of the nuclei; pyknosis is also encountered.

***Spleen.*—The changes in the spleen appear to be limited to the Malpighian bodies, in which the germinal areas are increased in size; mitosis is actively progressing, and nuclear degenerations while met with, occur less frequently than in the lymph glands."**

We would therefore advance the hypothesis that the condition which is present in the status lymphaticus is one of lymphotoxæmia. It is not necessary to assume, we think, that the toxæmia is constantly present; in fact the clinical pictures are more readily explained by the assumption that it is intermittent. In order to accept such an explanation it is of course necessary to assume that at times the so-called "horror autotoxicus" is in abeyance, and we can see no theoretical reason why this should not be the case. In this connection we quote from Dr. Welch's Huxley lecture. In speaking of cytotoxins he says:

But the really great practical questions in this domain relate to the production of autocytotoxins in the human and animal body. What is the nature of that very efficient regulatory mechanism underlying the horror autotoxicus which prevents either the action or the formation of autocytotoxins in consequence of absorption of our own degenerated and dead cells? Can this protective mechanism be overthrown by pathological states and self-generated cellular poisons become operative in the causation of anæmias, hæmoglobinurias, chronic interstitial inflammations, uræmia, eclampsia, epilepsy, and other diseases?

We would suggest that individuals who are subjects of the status lymphaticus are born with an instability of the mechanism regulating the "horror autotoxicus" at any rate so far as the lymphatic apparatus is concerned, so that they are subject to intermittent attacks of lymphotoxæmia which may lead to reflex nervous phenomena of various kinds, or may cause death from cardiac paralysis. During the attacks of lymphotoxæmia such individuals are especially susceptible to the action of bacterial or chemical poisons, and also to physical and psychical shocks, which at these times may cause their death under circumstances which would be trivial to a normal individual. Assuming the possibility of this hypothesis it would seem from experimental evidence that a so-called vicious circle might be established. Flexner's experiments show that the lymphocytotoxins cause a hyperplasia of the lymphatic apparatus, and succeeding mild attacks might therefore cause a progressive hyperplasia of the lymphatic apparatus, increasing the amount of lymphoid tissue which might take part in subsequent attacks of lymphotoxæmia.

Conclusions.

1. The condition known as the status lymphaticus is a definite pathological entity.

2. It is probably associated with, if not due to, a condition of intermittent lymphotoxæmia.

3. It may be associated with sudden death, probably as a result of lymphotoxæmia alone in some cases, or as a result of the action of toxic, physical, or psychic injuries, which are

rendered much more powerful than usual by the predisposing action of the lymphotoxæmia.

4. In some cases the sudden death is undoubtedly mechanical and due to asphyxia from pressure of the enlarged thymus on the trachea.

5. The subjects of the status lymphaticus can be recognized clinically in some instances.

Bibliography.

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Blake: Annals of Surgery, Vol. XXXV, p. 745, 1902.

Daut: Jahrbuch für Kinderheilkunde. Bd. XLVII, p. 141, 1898.

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Appendix.

Abstracts of the histories of the nine cases on which this study is founded, together with the abstracts of the autopsy protocols and histological examinations are here appended. We desire here to express our thanks to the following gentlemen who have kindly furnished us with the clinical histories of the cases: Drs. W. H. Happel, G. E. Lochner, W. G. MacDonald, H. L. K. Shaw, W. O. Stillman, T. M. Trego and Howard Van Rensselaer.

Group 1.—Cases dying suddenly or found dead in bed.

Case 1.—Female child, five months of age, St. Margaret's House, Service of Dr. Van Rensselaer. The child was apparently perfectly healthy until a few minutes before its death (February 10, 1899), when it suddenly became cyanosed and collapsed.

The *anatomical diagnosis* was: Enlargement of the thymus gland and the mesenteric lymph nodes. Cloudy swelling of the liver and kidneys.

The following notes regarding the pathological changes are extracted from the autopsy protocol:

Thymus Gland.—Is much enlarged, reaching to the base of the heart. It measures 5 x 3 cm. x 8 mm. On section it presents a normal appearance.

The mesenteric glands are enlarged, the largest of them measuring about 5 mm. in diameter. Some are firm and pale, others congested.

Intestines.—The mucous membrane is pale. In the ileum the Peyer's patches and solitary follicles are somewhat enlarged. The enlargement of the lymphatic apparatus is slight. The solitary follicles in the large intestine are slightly enlarged.

The spleen measures 4 x 3 x 1.5 cm. The surface is smooth. The consistency quite firm. On section the pulp is not increased, the trabeculæ are prominent, the Malpighian bodies are not visible.

The remaining organs showed nothing of importance.

Cultures were negative except that a few isolated colonies of the staphylococcus aureus were isolated from the lung.

Microscopic:

Thymus Gland.—Hyperplasia of the lymphoid elements is present. There is some proliferation of the endothelial cells lying along the trabeculæ. Degenerative changes in Hassal's corpuscles are marked.

Lymph Glands.—There is hyperplasia of the lymphoid structure and increased size of the germinal centers with swelling and proliferation of their constituent cells. There is swelling of the endothelial cells along the trabeculæ.

Spleen.—There is a slight general increase in the finer trabeculæ. Dilatation of the blood spaces is present with increase in the phagocytic cells of the organ. There are marked changes in the Malpighian corpuscles in the form of great proliferation of cells similar to those seen in the germinal centers of the lymph glands. A slight amount of degeneration of the proliferated cells is present.

The other organs aside from cloudy swelling of the liver and kidneys are normal.

Case 2.—Male child, 3 months of age. St. Margaret's House. Service of Dr. T. M. Trego. The child, who was apparently healthy, was found dead in bed. The autopsy was made twelve hours after death.

The *anatomical diagnosis* was: Enlargement of the thymus gland. General lymphatism. Cloudy swelling of the liver and kidneys. Slight congestion of the right lung.

The following notes are abstracted from the autopsy protocol:

Thymus Gland.—Is much enlarged. It extends from the episternal notch downward and covers the upper half of the precordia. It is pale and cloudy looking on section. It contains no hemorrhages. It measures 7 x 6 x 1.5 cm.

Mesenteric lymph nodes are considerably enlarged, soft, and on section pale gray in color.

Intestines.—The mucous membrane of the small intestine is pale. In the large intestine the solitary follicles are enlarged.

The Spleen.—Is free from adhesions. Measures 6.5 x 4 x 2.5 cm. The capsule is smooth, the consistency about normal. On section the pulp is not increased, the Malpighian bodies are prominent.

The remaining organs showed nothing beyond the lesions mentioned in the anatomical diagnosis.

Cultures were negative.

Microscopic:

Thymus.—Marked hyperplasia of the lymphoid tissue is present.

Lymph Glands.—The germinal centers are prominent and show proliferation of their constituent cells with some swelling of the proliferated cells and slight degenerative changes. The gland tissue is hyperplastic.

Intestine.—Changes in the lymphatic apparatus, similar to those described in lymph glands, are present.

Spleen.—There is proliferation of the cells in some of the Malpighian bodies similar to those seen in the germinal centers of the lymph gland.

CASE 3.—Male child, aged 18 days. Albany Hospital. Service of Dr. W. H. Happel.

A male child, apparently healthy and weighing 6½ pounds at birth, continued to gain weight up to the 14th day of his life. On the morning of the 14th it was noted that he had made no gain in weight but seemed otherwise well. At 4 p. m. he was found cyanosed at his mother's breast. He was unconscious, with crowing inspiration. The reflexes were abolished. The pulse was slow and gradually became slower. The respiration became quicker and shorter, and then both pulse and respiration ceased. The child became rigid, cyanotic and pale. The thorax was arrested during inspiration. The child became limp. After about thirty seconds a loud inspiratory shriek ushered in the respiration and the heart beats completing a marked attack of laryngismus stridulus. The attacks were repeated several times, the child never becoming conscious in the intervals. Death occurred seven hours after the onset of the first attack. The autopsy was performed 7 hours after death.

The *anatomical diagnosis* was: Enlarged thymus gland. Pulmonary œdema. Cloudy swelling of the liver with angiomata.

The following notes are abstracted from the autopsy protocol:

The thymus gland is much enlarged, measuring 5.5 x 4 x 2 cm. It extends well into the left pleural cavity reaching to the lower border of the third rib; it is composed of two distinct lobules. The capsule and gland are normal on section. The larynx and trachea show no evidences of compression.

The *lymph glands* posterior to the œsophagus are moderately enlarged.

The Intestines.—The mucous membrane shows patchy congestion. The follicles of the large intestine are enlarged.

The Spleen.—Measures 5.5 x 3.5 x 1.5 cm. The capsule is smooth, the consistency is normal. On section the Malpighian bodies are visible, and slightly enlarged.

Both lungs show a moderate amount of œdema.

The remaining organs are free from changes except those noted in the protocol.

Cultures showed the presence of a few colonies of the pneumococcus in the lung. The other organs were sterile.

Microscopic:

Thymus.—There is well-marked hyperplasia of the lymphoid tissue. Some endothelial proliferation along the trabeculæ is noted. Degenerative changes in Hassal's corpuscles are present.

Intestines.—There is hyperplasia of the lymphatic apparatus with proliferative changes in the cells of the germinal centers.

Spleen.—There is hyperplasia of lymphatic apparatus. Proliferation of the cells in the Malpighian bodies like that described in the other cases is present.

Lung.—Moderate œdema and congestion are present.

CASE 4.—Illegitimate female infant, 5 months of age. St. Margaret's House. Service of Dr. H. L. K. Shaw.

She was found dead in bed by the nurse. She had lost weight since her entrance on Nov. 12, 1900. On the night of her death she slept well until 4 a. m.; at 5 a. m. she refused her nourishment, and she was found dead at 5.30 a. m. Autopsy 10½ hours after death in cold weather.

Anatomical Diagnosis.—Marked hyperplasia of the thymus gland with so-called thymus abscess in the left lobe. Enlargement of the mesenteric lymph nodes. Swelling of the spleen. Cloudy swelling of the liver and kidneys. Congestion and œdema of the lungs. Subpleural hemorrhages. Slight swelling of Peyer's patches.

The following notes are abstracted from the autopsy protocol:

The thymus gland is enlarged, covering at least one-half of the præcordia and reaching to within 2 centimeters of the diaphragm. The organ consists of two large lateral lobes, and between these two above is a triangular area of gland also made up of two lobes. The left lateral lobe measures 5 x 3.5 x 1.3 centimeters. On section the gland tissue is very succulent. There is a smooth walled cavity .5 cm. in diameter in the interior of the left lateral lobe from which an opaque yellowish-gray fluid can be squeezed.

Lymphatic Apparatus.—The bronchial glands are enlarged, as are the mesenteric glands, both being normal in appearance. The Peyer's patches of the small intestine are slightly enlarged.

Spleen.—Is free from adhesions. The capsule is smooth. The organ measures 7.5 x 4 x 2 cm. There are a few subcapsular hemorrhages. On section the pulp is somewhat increased. The Malpighian bodies are prominent.

The other organs show nothing beside the lesions mentioned in the anatomical diagnosis.

Cultures were negative.

Microscopic:

Thymus.—There is hyperplasia of the lymphoid elements. Degenerative changes in Hassal's corpuscles are present.

Lymph Nodes.—There is hyperplasia of the lymphoid elements. The germinal centers are prominent. There is marked proliferation of the cells of the germinal centers, particularly in the centers of the areas. The proliferated cells are at times swollen and some have undergone degeneration.

Spleen.—The Malpighian corpuscles show a pallor of their centers, which under the high power is seen to be due to proliferation of the cells in the center of the corpuscles, associated with some swelling and degeneration.

CASE 5.—Illegitimate male child, 2½ months of age. St. Margaret's House. Service of Dr. Shaw.

The child did well after entrance and gained weight steadily. He was seen on the evening of his death at 7.30 p. m. when he looked well; when visited again at 9.30 p. m. he was

found to be dead. The autopsy was made 18 hours after death in fairly cool weather.

Anatomical Diagnosis.—Hyperplasia of the thymus gland with general hyperplasia of the lymphatic apparatus (status lymphaticus). Cloudy swelling of the liver and kidneys. Congestion of the lungs.

The following notes are abstracted from the autopsy protocol:

The *thymus gland* reaches from a point 1 cm. above the episternal notch to within 2 cm. of the diaphragm in the middle line. The organ measures 7 x 4 x 1.5 cm. On section it is normal in appearance.

The spleen measures 6 x 4 x 1.5 cm. The capsule is smooth. The consistency is rather soft. On section the pulp is normal. The Malpighian corpuscles are distinctly swollen, quite prominent.

Glands.—The mesenteric lymph glands are distinctly enlarged. The largest one measures 1.5 cm. in its longest diameter. They are normal looking on section. The cervical glands are slightly enlarged.

Intestines.—The lymphatic apparatus just above the valve and in the large intestine is slightly swollen.

The *tonsils* are slightly enlarged.

Cultures show the presence of the staphylococcus pyogenes albus and the pneumococcus in the lung. The other organs are sterile.

Microscopic:

The *thymus* shows hyperplasia of its lymphoid elements. The corpuscles of Hassal show the usual degenerative changes.

Lymph Glands.—A general hyperplasia is present and also focal lesions in the germinal centers in the form of marked proliferation of the clear cells. Occasional degenerated cells are to be seen.

Spleen.—The changes are limited to the Malpighian corpuscles. The centers show marked cellular proliferation with some degeneration. In a few places the vessels show proliferation of their lining endothelium.

Case 6.—Female child, 10 months of age. Private case of Dr. G. E. Lochner.

The mother of an apparently healthy female child, ten months of age, was in the habit of putting her to sleep in a baby carriage on the veranda while she attended to her household duties. On March 16, 1903, she followed her usual custom. Whilst working near an open window in the neighborhood of the baby carriage she heard the child move, and looking out at her saw her struggling. Thinking that she was merely struggling in her sleep she avoided going very close to her, but on returning and looking at the child a few minutes later she found her dead.

The autopsy was made 24 hours after death in cool weather.

Anatomical Diagnosis.—Hyperplasia of the thymus gland with so-called abscess of the thymus. General lymphatism most marked in the lymphatic apparatus of the mesentery and intestine. Swelling of the spleen. Cloudy swelling of the liver and kidneys.

The following notes are abstracted from the autopsy protocol:

The *thymus gland* is enlarged extending well down over the base of the heart. Its average measurements are 8 x 4.5 x 1.5 cm. It weighs 27 grammes. It consists of two distinct lobes, in one of which is a smooth walled cavity, containing what looks like hemorrhagic pus. The gland otherwise appears normal, though rather succulent.

Lymphatic Apparatus.—The bronchial glands are enlarged and succulent. The mesenteric lymph nodes are many of them enlarged, pale and succulent. The lymphatic apparatus of both the large and small intestine is exceedingly prominent. Peyer's patches stand out prominently. The solitary follicles appear as whitish, opaque, rounded nodules projecting distinctly from the surrounding mucosa which is quite pale.

The *spleen* is free from adhesions. It is softer than normal, but not increased in size. On section the pulp is increased, the Malpighian bodies are not particularly prominent.

The other organs show nothing beyond the changes noted in the anatomical diagnosis.

Microscopic:

Thymus.—There is marked hyperplasia of the lymphoid tissue. Degenerative changes in Hassal's corpuscles are present.

Glands.—There is general hyperplasia. Marked proliferative changes in the germinal centers with slight degenerative changes are noted.

Spleen.—There is marked hyperplasia of the Malpighian corpuscles which are diffuse. Slight proliferative changes are seen in the centers of some of the Malpighian bodies.

Group 2.—Cases of Infection Modified by Status Lymphaticus.

Case 7.—Male, 13 years of age. Private practice of Dr. W. O. Stillman.

The patient, a boy of 12 years, accidentally wounded himself on the inside of one of the fingers of the right hand while discharging a toy pistol July 3, 1900. The wound was a very slight one and attracted but little attention. It was treated with ordinary home remedies and appeared to be doing fairly well, although there was a very slight discharge from it. The patient remained in good health until Friday, July 6, when he complained of headache, chilliness, general malaise and sore throat. He was seen on Friday evening by a physician, who administered some palliative remedies. The patient had a very restless night Friday night, complained of most intense headache, pain in the back of his neck, as well as general aching through the muscles of the back, arms and legs. The temperature on Friday was somewhat elevated, between F. 100° and 101°. On Saturday morning the patient appeared to be somewhat worse, the temperature was in the vicinity of 101° F., the throat was quite sore and the tonsils decidedly swollen. The headache and other pains were about the same. The case was regarded as one of tonsilitis and treated as such. The patient's symptoms became somewhat worse during the day on Saturday and he passed an extremely restless and uncomfortable night Saturday night. Saturday

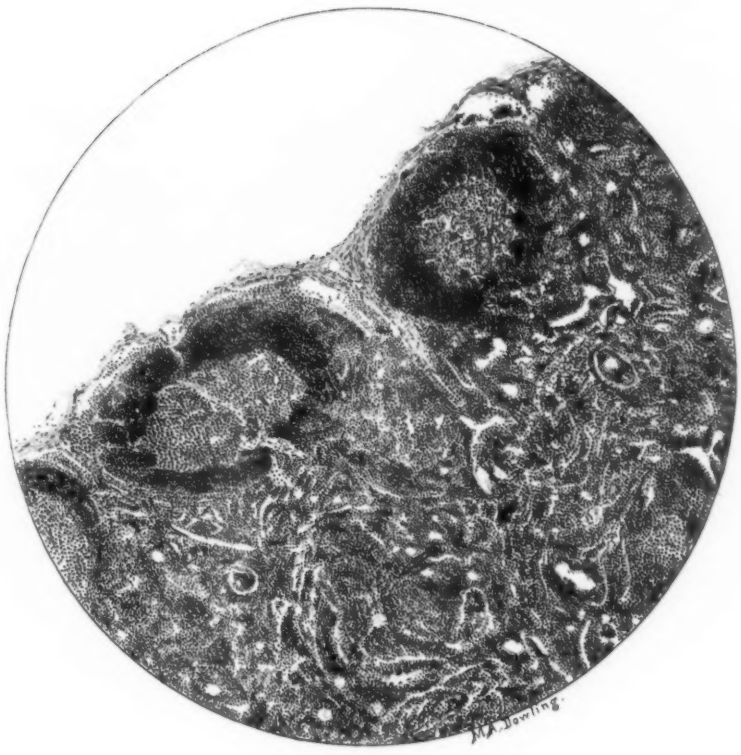

FIG. 1.—Low power drawing to show the changes in the lymph glands. General hyperplasia of the glandular tissue and focal changes in the germinal centers.

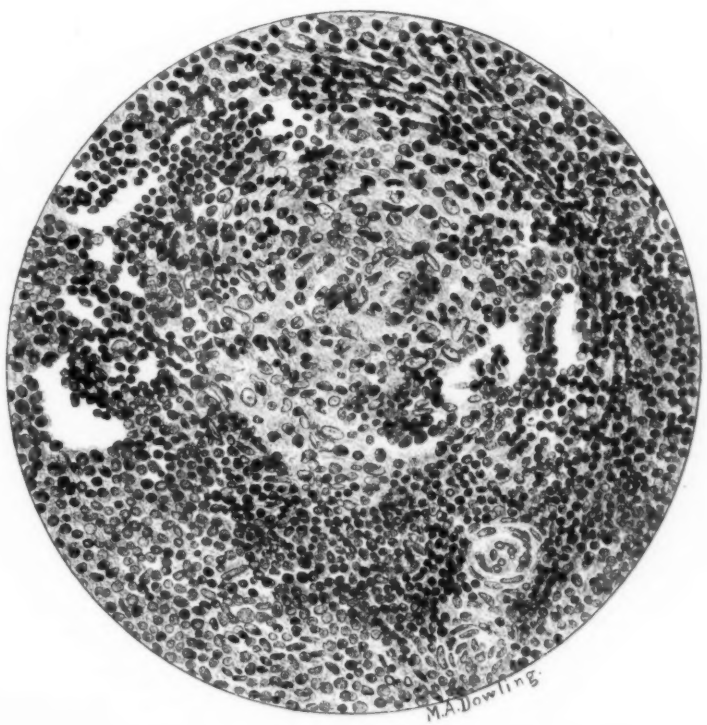

FIG. 2.—High power drawing showing the lesions in a Malpighian corpuscle of the spleen. The drawing shows the proliferative changes in the cells of the Malpighian body and slight degenerative changes.

afternoon he complained of some difficulty in opening the mouth, which at the time was attributed to the swollen tonsils. This difficulty became worse during the night, and on Sunday forenoon, about 10 o'clock, all of the patient's symptoms having become decidedly worse, he was suddenly seized with opisthotonos, and died in a few minutes.

The autopsy was done on the morning of the following day, Monday, by Dr. Elting.

Anatomical diagnosis.—Wound of left index finger. Tetanus. Enlarged persistent thymus. Cloudy swelling of liver. Congestion and cloudy swelling of the kidney. Acute spleen tumor. Hypostatic congestion of the lungs.

The following notes are abstracted from the autopsy protocol:

Over the middle phalanx of the left index finger on the inner side is a small ulceration 8 millimeters in diameter extending into the subcutaneous tissue, from which there is a slight purulent exudate.

Thymus.—Is persistent and enlarged, measuring 9 x 6 cm. in its greatest diameters. It presents two well-marked lobes. On section the gland presents at the tip of each lobe a small cavity about 1.5 cm. in diameter, containing a small amount of serous fluid; otherwise the tissue of the gland is normal in appearance.

Spleen.—It is free from adhesions. Measures 14 x 8 x 4 centimeters. The consistency is somewhat diminished, the Malpighian bodies are visible, the pulp increased and softened, the trabeculæ normal.

Glands.—The mesenteric are slightly enlarged, pale and homogeneous in appearance.

Cultures from the finger wound showed the staphylococcus pyogenes aureus and the colon bacillus; the same organisms were isolated from the throat.

Cover-slips from the finger wound showed numerous typical drum-stick tetanus bacilli with spores.

Microscopic:

Thymus.—There is hyperplasia of the lymphoid tissue with swelling and proliferation of the endothelial cells along the trabeculæ. Degenerative changes in Hassal's corpuscles are present.

Lymph Glands.—There is marked general hyperplasia. Slight proliferation in the cells of the germinal center is apparent.

Spleen.—There is hyperplasia of the lymphoid tissue of the Malpighian bodies. There is dilatation of the blood spaces with blood. There is an increase in the phagocytic cells of the organ.

Case 8.—F. S., male, 13 years of age. Albany Orphan Asylum. Service of Dr. T. M. Trego.

His family history is unknown. Personal history: He was never a strong child. He could not run around and take violent exercise with other boys of his age without becoming short of breath. His only illness was measles one year before his death. He was feeling perfectly well on the day of his death. After his evening meal he became cyanotic, had one or two general convulsions and died in 15 minutes.

Autopsy 17 hours after death. Cold weather.

Anatomical Diagnosis.—Great enlargement of the thymus gland with general lymphatism. Acute bronchitis with congestion of the lung. Cloudy swelling of the liver. Congestion of the kidney. Chronic gastritis with dilatation of the stomach. Meckel's diverticulum.

The following notes are abstracted from the autopsy protocol:

Thymus Gland.—Much enlarged, reaching to within 3 centimeters of the diaphragm on each side. It consists of three lobes, a central one in the shape of an elongated oval, measuring 6.5 x 3 x 1 cm., and on each side of this two triangular lobes with their bases at the neck and their apices and bodies lying over the pericardium; each of these bodies is 3.5 centimeters wide at the base, 10 centimeters in length and 1 centimeter in thickness. On section the substance of the gland appears normal.

Lymphatic apparatus.—The mesenteric glands are swollen and pale. The tonsils are much enlarged. The follicles at the base of the tongue are enlarged, and the intestinal lymphatic apparatus is swollen and prominent.

Spleen.—Is free from adhesions. The surface is smooth; consistency softer than normal. The Malpighian corpuscles are prominent. The pulp is slightly increased.

The other organs show no changes beyond those noted in the anatomical diagnosis. The central nervous system is normal.

Cultures show a general streptococcus infection, the organism was isolated from the lung, liver, thymus and kidney.

Microscopic:

Thymus.—Hyperplasia of lymphoid tissue. Increase in polynuclears. Degenerative changes in Hassal's corpuscles.

Tonsil.—Hyperplasia of lymphoid tissue. Marked increase in size of germinal centers. Proliferative changes in germinal centers. Slight degenerative changes. A few areas of necrosis with polynuclear infiltration.

Glands.—Hyperplasia of the lymphoid tissue. Proliferative and degenerative changes in germinal centers.

Lung.—Bronchitis and peribronchitis.

Group 3.—Death Under Chloroform in the Status Lymphaticus.

Case 9.—M. E. C., aged 7. Albany Hospital. Service of Dr. W. G. MacDonald.

The family history is negative. The child has had mumps, measles and chicken-pox. Several months ago she had an ulcerated tooth. Later she developed swelling of the face, with a temperature of F. 105° and convulsions. She was brought to the Albany Hospital, and the signs of necrosis of the jaw were detected. She was operated on for the removal of a sequestrum from the lower jaw and when the operation, which was not a severe one, was almost completed she suddenly stopped breathing. All attempts at resuscitation failed, even tracheotomy.

Autopsy 2 hours after death in cold weather.

Anatomical Diagnosis.—Hyperplasia of the thymus gland with general lymphatism. Cloudy swelling of the heart muscle and kidneys. Fatty infiltration of the liver.

The following notes are abstracted from the autopsy protocol:

The *thymus gland* is greatly enlarged, extending downward and covering the superior two-thirds of the præcordia. It measures 14 x 10 x 2 centimeters and weighs 30 grammes. On section it is normal in appearance.

Lymphatic Apparatus.—The mesenteric glands are enlarged throughout, some pale, others congested. The bronchial glands are enlarged and congested. Peyer's patches are considerably enlarged and congested, but not ulcerated.

Spleen.—Is not enlarged. Consistency softer than normal. On section the Malpighian bodies are swollen and prominent.

The other organs showed nothing but the changes noted in the anatomical diagnosis.

Cultures were all negative, except the culture from the lung, which showed two organisms: (1) the diphtheria bacillus, (2) a bacillus of the B. mucosus capsulatus group. Both organisms were tested on animals and found to be non-virulent.

Microscopic:

Thymus Gland.—The gland shows marked hyperplasia of the lymphoid tissue. There are very few Hassal's corpuscles left and these are degenerating.

Glands.—There is a general hyperplasia of the lymphoid elements. Proliferative and degenerative changes are present in the germinal centers.

Spleen.—Proliferative changes in the centers of the Malpighian corpuscles, accompanied by slight degenerative changes, are present.

Changes in the intestinal lymphatic apparatus, similar to those observed in the lymph nodes, are present.

A CASE OF SYPHILIS OF THE PERIPHERAL NERVES AND LUNGS.

By Charles M. Remsen,

From the Pathological Laboratory, Johns Hopkins University.

The rarity of syphilitic lesions of the lung has been a long-recognized fact, while syphilitic lesions involving the peripheral nerves, though common enough, have never been described histologically to any great length. In view of these facts, it has seemed justifiable to present this case, in which both lung and nerves have been involved, and in which, fortunately, it was possible to make a complete histological examination.

Nonne[1] has called attention, in his description of the clinical symptoms of syphilitic involvement of the peripheral nerves, to the possibility of the compression by syphilitic growth of nerves in their passage through the various foramina and at certain points along their course favored by anatomical relations. Occasionally there may be active changes going on in the nerve itself, principally in the inflammation of its membranes, or vascular changes affecting the supplying arteries, leading to atrophy, necrosis and caseation. The nerve roots may be involved in a diffuse thickening, or may have nodules scattered along their course; frequently, in the latter case, the administration of mercury has caused a complete clearing up and return of the affected nerve to the normal condition. Conditions such as these, he further states, have been observed clinically, principally as neuralgias—especially the trifacial form—and as syphilitic multiple neuritis, which is more frequent, but anatomical observations are lacking.

Berkeley[2] has made reference to two cases in which the peripheral nerves have been involved in syphilomata, and has given a very brief anatomical description of them in his paper.

Concerning pulmonary syphilis, the literature is abundant; and yet in this process we have a condition so rare that, according to one good authority, it could claim, in 1898, but ten undisputed specimens in all the London museums and hospitals. Fowler[3] states the possibilities of syphilitic conditions of the lung. Besides the bronchial catarrh which may occur during the period of incubation or during the secondary manifestations, he gives five principal modes of affection which may be evidenced in acquired syphilis, all belonging to the late tertiary period. (1) Gumma, which very rarely may break down to form cavities, but which far more frequently leads to the formation of dense cicatricial tissue. (2) Broncho-pneumonia—exceedingly rare. (3) Fibroid induration—frequently extending in from the hilus along the bronchi and vessels. (4) Changes in the bronchial glands and lymphatics of the lung. (5) Syphilitic phthisis.

Neumann has placed the conditions under three headings, namely, a diffuse lobar infiltration, a gummatous form, and and an interstitial pneumonia.

Hutchinson[4] agrees as to the rarity of the true pulmonary syphilis, but says the disease may attack the lungs at any stage. In the early stages, merely temporary congestion is observed, while later on local parenchymatous changes with a tendency towards retrogressive changes may occur. He

[1] Nonne: "Syphilis des Nervensystems."

[2] Berkeley: "Nerve Degeneration in Some Syphilitic Growths." Johns Hopkins Hospital Bulletin, 1891, No. 13.

[3] Fowler: "Disease of the Lungs," Fowler and Goodlee. Chap. xxxvii.

[4] Hutchinson: "Syphilis," p. 252.

thinks the process of infiltration far more common than the presentation of isolated gummata.

As to the seat of the lesion, there appears to be a more or less general opinion that the apex, which is most commonly affected in tuberculosis, is not usually the primary seat of affection, but rather the region of the hilus, or the middle lobe; while the possibility of excavation and cavity formation, so often observed in tuberculosis, seems very slight, judging from the frequent occurrence of final results which approach the condition of fibroid phthisis.

Councilman[5] has given a detailed description of two cases of pulmonary syphilis in which he urges the belief that hyaline degeneration of capillaries, possibly due to the action of the specific virus, is the first step in this pulmonary disorder. This is followed by atrophy of the alveolar walls, which is associated with a fibrinous exudate, epithelial proliferation, and other acute changes. The essence of the gumma formation is a pneumonia, with fibrinous exudation, associated with a fibrous thickening of the alveolar walls, the whole finally becoming caseous. He considers all cavities supposedly due to the excavation of gummata to be really bronchiectatic.

The case is one of a colored man, æt. 27, admitted to the Neurological Dispensary first in October, 1900, complaining of the loss of the use of his left forearm. The trouble dated back to June, 1899, at which time he was vaccinated on the left arm. Subsequent to this, his arm had swollen badly, become very painful and had been entirely useless for two weeks. The pain had lasted seven months, and then a sensation of pins and needles had set in. The weakness in his arm progressed so that in May, 1900, he could not extend his hand. The examination showed atrophy of the left arm; and though he could move his arm and forearm freely in all directions, the voluntary extension of the hand was impossible, thus giving a typical "wrist drop" position. The electrical examination showed weak reaction or no reaction at all in the muscles supplied by the musculo-spiral nerve, while further examination suggested slight involvement of the ulnar and median nerves. He was next heard from in April, 1902, when he was admitted to the Johns Hopkins Hospital complaining of hæmorrhage from the mouth. His illness dated back one year, when he had had a cough, bloody expectoration and shortness of breath, and, shortly before admission, a severe hæmorrhage from the mouth. The examination at this time showed marked atrophy of the left arm—the extensors in the left forearm being useless—and great tenderness existing along the course of the nerves. Râles and slight impairment over the upper left chest were made out. In less than one month, having gone rapidly downwards, he died during a severe hæmorrhage from the lungs.

The case was in no way to be distinguished from pulmonary tuberculosis, except that the examination of the sputum was negative for tubercle bacilli.

At the autopsy, both lobes of the left lung were extremely emphysematous. The apex of the upper lobe was firmer than the surrounding tissue, and there were a few scattered nodules on its surface. On section, just below the apex, was seen a caseous area, surrounded by scar-like tissue, fairly well demarcated from the surrounding lung. In the bronchus was a large clot, extending into the various branches. A large nodule in the lower lobe was found entirely caseous, with strands of grayish fibrous tissue running through it. The right lung showed various hæmorrhagic areas and a few firm nodules scattered on its surface. The lower lobe was almost entirely caseous, while section of the upper lobe showed a few circumscribed areas of caseation. The bronchial glands were enlarged and contained indefinite caseous masses. In the lower lobe there was a cavity about 3.5 cm. in diameter, fairly well marked out from the surrounding lung tissue, filled with blood, and having a bronchus opening directly into it; a probe could be passed direct from the pulmonary artery into this cavity.

The left arm was greatly atrophied and at a point in the axillary region there was found an irregular elongated mass of tissue about 2 cm. in thickness which involved the nerves and blood-vessels. Both above and below this mass the nerves could be separated and appeared macroscopically more or less normal. The artery was clear of thrombi, but the veins were quite occluded by a dark thrombus mass.

The microscopical examination of the lung shows various features, some of which predominate in some sections, some in others, so that it has seemed best for the sake of brevity to detail them as far as possible in one general description.

Large portions of the lung are free from very extensive pathological alteration, and show chiefly the results of the aspiration of blood into bronchi and alveoli subsequent to the hæmorrhage. In most of the sections, however, there is a consolidation produced by a combination of processes. Everywhere there are œdema and proliferation of the epithelial cells of the alveoli; in these areas and in many alveoli the desquamation of the cells is sufficient to fill up the lumen. Many alveoli contain also polymorphonuclear leucocytes and fibrin in considerable quantities, and eosinophile cells are especially abundantly scattered through the tissue. In many areas widespread organization of the exudate has occurred, so that the alveolar lumina are frequently almost entirely occupied by the plugs or columns of newly formed connective tissue. All of these processes, however, are relatively less striking than the great interstitial inflammation which affects the lung, especially about the areas of caseation mentioned. This leads to the great thickening of the alveolar walls and interlobular septa—sometimes by the appearance of abundant new connective-tissue cells with rounded nucleus and rather branchy cell body—at other times by the production of dense strands of elongated fibrous elements. This process may be so extreme as to render the alveolar lumen in each instance a relatively small cavity lying in a mass of fibrous tissue and separated from its neighbor; often such lumina are entirely pushed aside or obliterated. The process so far, then, is similar to such types of tuberculous pneumonia without the

[5] Councilman: "Syphilis of the Lung," Johns Hopkins Hosp. Bull. 1891, No. 11.

appearance of tubercles as are sometimes associated with the ordinary gelatinous and caseous pneumonia. Some caseous areas do occur here, and in places it seems that the lung tissue such as has just been described becomes necrotic or caseous en masse, so that the original alveolar structure can still be traced throughout the caseous material. In other instances we find that the caseation occurs really in the center of a large newly formed mass of epithelial cells with intercellular substance, vessels, etc., all of which are arranged together in a firm mass with radiating bands into the surrounding tissue. The central portion being approached, we find the epithelial cells finally giving way to fragmented nuclei which pass over into a red staining hyaline substance which represents the caseous material seen macroscopically. Even here one occasionally discerns the alveolar lumina, so that we probably have to deal here also with a successive interstitial new formation of tissue. Exactly this appearance is found in the wall of the cavity, which is made up of such indurated tissue with occasional distorted alveolar lumina inclosed, and composed largely of abundant epithelial cells without any evidence of circumscribed tubercle formation. Foci of coagulative necrosis with definite fibrin networks are continuous with the necrotic material which lines the cavity. In other portions of the cavity wall we find only a much thinner zone of indurated tissue, the necrotic lining of the cavity having been produced at that point by the caseation of the consolidated lung tissue and still showing its alveolar structure.

A similar proliferation of endothelioid cells with intercellular material is highly developed on the bronchial walls near the cavity, but caseation has not appeared there. The blood-vessels in these areas show frequently an extreme obliterative endarteritis, sometimes leading to the complete occlusion of the vessel, and in other cases there seems to be a development of new channels within the tissue, which leads to the obliteration of the old. The small vesicles in the tissue which is not densely consolidated are frequently surrounded by a zone of lymphoid cells.

Numerous sections through these areas studied with great care after staining by Mallory's method for the demonstration of tubercle bacilli failed to reveal any.

To resume, we have a focal affection of the lung in which œdema with the proliferation and desquamation of epithelial cells form the early changes. Associated with these come the exudation of a few leucocytes and the formation of a fibrin coagulum in the alveoli. In places caseation en masse supervenes, while in other areas, and especially about these areas of caseation, organization of the exudate and great interstitial proliferation of connective tissue occur. This latter in the form of masses of epithelioid cells displacing and obliterating the alveoli may also undergo a coagulative necrosis. No tubercles or tubercle bacilli can be found.

Superimposed upon this is an acute bronchitis and beginning bronchopneumonia due to infection with the streptococcus pyogenes which occurs in great masses in the bronchial exudate.

The examination of the nerves has proven interesting. Above the growth spoken of in the axilla no degeneration was demonstrable, the nerves appearing normal with the exception of one to two funiculi which show a slight increase over normal of the connective tissue nuclei. Through the lesion changes are seen which correspond well to the clinical examination. Here, an area taking in the artery, vein and nerve bundles, at the upper part of the lesion, shows a rather diffusely scattered growth, composed of cells with long and narrow nuclei, the latter being often bent and curved to form an irregular picture which corresponds almost exactly with the fibrous growth in the lung. This seems to infiltrate the connective tissue at will—in places densely cellular, at times almost devoid of nuclei—while some areas are even caseous. The artery shows a great thickening of the intima on one side, which, however, seems to bear no relation to the amount of infiltration of the adventitia by the growth at a corresponding point in its outer wall. Examination of the nerve bundles shows plainly the fact that where the growth is found surrounding the nerve bundles, degeneration has set in. One nerve bundle especially shows in the first place an infiltrated epineurium, while the perineurium and endoneurium are so densely infiltrated as to lead to the formation of thick fibrous bands in their places, the former of which lies always in close apposition to the separate funiculi. The perineurium is in some places infiltrated to such an extent that it forms a band thicker than the inclosed funiculus. In some places a whole funiculus is divided into a meshwork of interlacing strands of thick fibrous-like tissue, in the alveoli of which lies the degenerated nerve tissue. In some cases the tissue, which is densely cellular, shows commencing nuclear fragmentation and caseation to a slight degree. As for the nerve fibrils, the axis cylinders are greatly swollen and irregular, their appearance being, when viewed longitudinally, of irregularly thickened zigzag rods, the neurilemma throughout being intact. The myelin sheath appears swollen, but what is more marked is the exaggeration of its trabeculæ, which stand out most plainly as an irregularly interlacing network, in the midst of which may be seen the distorted axis cylinder. Fine pigment dots are scattered over the whole of the nerve tissue. Another nerve bundle shows the extreme degeneration; it is surrounded in the region of the epineurium by the intact growth. The epineurium itself is represented by a caseous, almost structureless, faintly staining mass, inside of which is an area in which with great difficulty may be seen the caseous "shadows" of the peri- and endoneurim. The fibrils of the different funiculi show no axis cylinders or myelin sheaths, and in fact are almost completely caseous.

In the lower part of the lesion practically the same picture is repeated, with perhaps the addition of more or less hæmorrhage especially in the involved perineuria, it occasionally being very extensive and infiltrating along the endoneuria and among the separate nerve fibrils. It might be noted here that one nerve bundle has passed down through these sections, showing no involvement by the growth in any region.

Below the lesion the arteries are normal, the veins thrombosed. The involved nerves show none of the caseous condi-

tion such as existed in the lesion where the nerve was directly involved, but rather a distinct retraction from the normal perineurium of the various funiculi, the intervening space (between nerve fibrils and perineurium) being filled by a very sparsely nucleated, loose, fibrillar network of connective tissue origin. Few intact axis cylinders or myelin sheaths are seen.

It is interesting to note the condition of the muscle below the lesion—probably the triceps—which shows great proliferation of the sarcolemma nuclei, which are frequently collected together into well defined groups. The fibers in many instances have lost their cross striation, and viewed from the side seem to pursue a rather zigzag course. Frequently the protoplasm takes no stain and only the cell outline is seen. Large areas have been supplanted by loose fibrous tissue.

The histological examination of the vaccination mark showed merely scar tissue.

To review briefly, therefore, we have a case clinically simulating pulmonary tuberculosis, in which repeated examination of the sputum for tubercle bacilli was negative and in which microscopical examination of the diseased portion of the lung has shown no tubercles or tubercle bacilli. The lesions in the lung are predominantly of the type of the diffuse syphilitic consolidation such as is described by Councilman, with definite areas of caseation and with organization of part of the exudate and induration of the lung by new growth of interstitial tissue. Especially interesting is the occurrence of cavity formation by the disintegration of the caseated tissue with erosion of a vessel and fatal hæmorrhage, which is so sharply in contrast with the finding of Hiller and Councilman, who expressed their belief that there can be no such thing as a syphilitic phthisis and that any cavities in such lungs are bronchiectatic. In the lesion of the nerves also there is no evidence of a tuberculous infection but every character of a syphilitic neuritis, with caseation of the new formed tissue and the nerves and consequent degeneration of these nerves and the paralysis and degeneration of the muscles which are innervated by them.

We may apparently assume from this case that the nodes or lumps observed along the nerves in certain patients suffering from syphilis, which disappear on the administration of mercury, are of a gummatous nature and if not disturbed may undergo caseation with the complete destruction of the involved nerves and subsequent changes in the muscle supplied by these nerves.

In conclusion, I wish to express my very great thanks to Dr. Wm. G. MacCallum, at whose suggestion and under whose supervision this work was done, for his kind assistance and advice.

THE MEDICINE AND DOCTORS OF JUVENAL.*

BY EUGENE F. CORDELL, M. D.

(REVISED.)

In a paper read before this Society last year,[1] I endeavored to throw some light upon the medicine of Rome in the Augustan Age, by an examination of the writings of the Latin poet, Horace. So far as I could find, there was no article dealing with his works from this point of view. As an attaché of the Imperial Court and a favorite of the great Prime Minister, Maecenas, Horace must have come in daily contact with men of all classes, so I felt sure that he would have something of interest to say regarding the state of medicine and the medical profession in the great Roman metropolis. My researches were amply rewarded, bringing to light, among other things, an unexpected and most agreeable addition to our knowledge of those times, in the fact of the close intimacy existing between Horace and Celsus, the great medical writer of the Augustan Age; at the same time furnishing some interesting details regarding the almost unknown personal history of the latter. To-night, let us turn our attention to Juvenal—in full, Decimus Junius Juvenalis Aquinas. Please note the threefold appellation, indicating distinction; and I would call your attention especially to the last name, or agnomen, indicating that he was a native of Aquinum (a town of the Volsci in Latium), because it corresponds with the analogous title of Albinovanus given by Horace to Celsus; Juvenal of Aquinum, Celsus of Albinova.

Of all Roman writers of their times, Horace and Juvenal give us most insight into the customs and manners of their countrymen. As satirists, they deal especially with the growing and fatal degeneracy of the Romans, and yet with a pronounced difference of method. Horace, self-indulgent, lax in life and morals, himself not untouched by the sins and weaknesses which he condemns, yet frank and free from meanness, servility and hypocrisy, more human and therefore less perfect, but with all his weaknesses, more lovable; Juvenal, strict in life and morals and intolerant of vice in others. Horace, not separated from us by any class distinctions; Juvenal, a member of the legal profession, a distinguished advocate, and naturally approaching his subject from the point of view of a prosecutor. Horace, with more observance of the proprieties of speech, attacks vice by rendering it ridiculous; we can almost see the merry twinkle of his eye and hear his half-suppressed laugh as he sees his victims scamper across the stage, pursued by the shafts of his wit and irony, and catch

*A paper read before the Johns Hopkins Historical Club, Baltimore.

[1] Johns Hopkins Hosp. Bull., 1901, xii, p. 233.

his whispered aside, "They are not much worse than the rest of us after all." Juvenal is plain almost to the point of brutality, and holds up vice to our gaze in all its hideous nakedness; he shocks us with the wickedness of his times, and renders his victims utterly hateful and despicable; he is above sympathy and affection, he has no humor or pity, and he never smiles; he deals out his fierce invective with the sternness of an implacable judge, sparing none; he is like some irate Jove hurling thunderbolts from a mountain top with his red right hand. Horace deals more with vice in the abstract, the follies of the classes and the masses, often with the mere weaknesses of poor human nature; vice had advanced with rapid strides by Juvenal's time, and a more drastic method was called for. Juvenal attacks individuals directly; he seizes and holds them—they cannot escape until he has wreaked his vengeance; he loves, too, to aim at high prey—the wife of a great Senator eloping across the sea with a scarred gladiator—the Empress Messalina standing naked in the common brothel and prostituting herself for pay to its patrons—even the Emperor himself, through his favorite actor, Paris. Let us see what this *clarus satyricus*—this *princeps satyricorum* has to say of medicine in his day.

Before proceeding with this, I would remark, that, as in the case of many other great men of antiquity, but little is known of his life. He probably lived between A. D 20 and 100, and he attained a great age. He was the son or foster-son of a rich freedman and had the advantage of a learned education, pleading causes at Rome with great reputation in the time of the Emperor Claudius, A. D. 41 to 54. He never knew Horace, who died 8 B. C., but he probably knew Celsus, who is believed to have written the last part of his great encyclopedia, that upon medicine, in the latter period of his life, about A. D. 40.

You will recall the confidence, the homage, the obedience shown to the physician by Horace. We cannot expect such a frame of mind in Juvenal, whose faith could never blind him to the imperfections and the weakness of the immature profession of his day. Accordingly, in the famous SatireVI., we find a certain Greek surgeon, Heliodorus by name, represented as engaged in castrating the young slaves who have just reached robust puberty—"*bilibres testiculos*"—in order that their mistresses may use them with impunity for the gratification of their lusts. A physician of this name is said to have practised at Rome during the reign of Trajan (A. D. 98-117), and to have written upon surgical subjects, but his writings have nearly all been lost. It is a pity that his memory did not share a similar fate, and we can only hope that his case was a solitary one, even at Rome.

A fling is made at the profession in Satire X.; I quote the entire passage, which is of literary as well as medical interest. Speaking of old age and of the dangers which threaten it, he says: "Moreover, the scanty blood which flows in his chill body is warmed by fever alone. All kinds of diseases dance round him in a troop. If you were to ask their names, I could sooner tell you how many lovers Hippia" (the eloping Senator's wife) "had; how many patients Themison has killed off in a single autumn (*quot Themison ægros autumno occiderat uno*); how many partners Basilus has cheated; how many wards Hirrus has defrauded; how many men tall Maura has submitted to the embraces of in a single day; how many pupils Hamillus corrupts." Themison is here used for the profession in general, and the selection shows his prominence at Rome. The association of the name with lewd women, false guardians, corrupt teachers and dishonest merchants, enhances the sharpness of the satire. Who, then, was this Themison, the profession's representative in infamy? He was a Greek physician of Laodicea, a pupil of Asclepiades of Bithynia, who settled in Rome about the last half of the first century B. C. He lived, therefore, before the time of Juvenal, and he was the immediate predecessor of Celsus, who refers to him in six places. "Asclepiades," says Celsus in his preface, "changed in great measure the art of healing. Themison, one of his successors, has lately, in his old age, differed from him in some things. The profession of medicine has been greatly improved for us by these eminent men." Themison was the head of the sect of Methodists, whose tenets Celsus gives in the following passage: "Some physicians of our own age under the authority of Themison (as they wish it to appear), contend that a knowledge of the cause can have no influence on the treatment, and that it is sufficient to observe some of the most common affinities of diseases, of which there are three kinds: 1. Constipated; 2. Relaxed; 3. A mingling of these two. For sometimes the secretions are too scanty, sometimes too abundant, or too scanty in one part and too abundant in another. Diseases, too, are sometimes acute, sometimes chronic; they may be progressing, at their acme, or on the decline. Now, when the complaint arises under any of these circumstances, if the body be constipated, it should be relaxed; if it suffer from a flux, this should be restrained; if it take on a complicated character, we must relieve the more violent manifestations. We ought also to treat an acute disease differently from a chronic one; one that is progressing, differently from one that is at its acme or on the decline. Such principles and action constitute the theory and practice of medicine—a certain way of proceeding which the Greeks call method (μέθοδος)." Later, as we learn from Celsus, the disciples of Themison were not all in entire agreement as to their doctrines. Celsus also gives a composition for the ear, devised by Themison. He is also mentioned by Pliny, Seneca, Soranus and Cælius Aurelianus, and some of his teachings have been preserved for us in the writings of the last two authors. He was the author of a work on chronic diseases, was the first to introduce leeches into practice and the first to write upon elephantiasis.

In Satire III., among the crowds of foreigners who had flocked to Rome, attracted by the hope of gain or plunder, a Greek adventurer is depicted, a sort of jack-of-all-trades "with a quick wit, desperate impudence, speech ready and more rapid than that of Isæus" (the preceptor of Demosthenes), ... "grammarian, rhetorician, geometrician, painter, anointer, soothsayer, rope-dancer, physician, wizard—

he knows everything. A hungry Greek will go into heaven if you command!"

"Doctor Trypherus" is mentioned in Satire XI., but he was a doctor of the art of carving, not of medicine, although one cannot be certain that he was devoted exclusively to this pursuit—he may have added it to the long list of accomplishments of the Greek.[1a]

In Satire XIII., a physician by the name of Philip is referred to, whose insignificance is emphasized by the words of the satirist: "Let doubtful cases be treated by greater physicians; you may safely entrust your vein to a pupil of Philip," *i. e.*, your case is so simple, you are so manifestly insane that it requires no professor in the art to treat you—a mere novice may bleed you.

There are some other references to doctors. In Satire VI., which deals with the wickedness of the Roman women, an adulterer, impersonating Archigenes, a physician, is admitted by a mother pretending to be sick, in order that he may have secret intercourse with her married daughter. Strange to say, there is no intimation that the physician was in any way an accomplice to this fraud. Archigenes was a native of Apamea in Syria, a contemporary of Heliodorus, and died at Rome in his seventy-third year. He is referred to with respect by Galen twelve times, and by Cælius Aurelianus once. He was an Eclectic and enjoyed considerable reputation as writer, practitioner and surgeon. In surgery, among other things, he described amputation with preliminary ligation of the main vessel of the limb. Only a few fragments of his writings, which took a wide range of subject, are preserved in the works of Cælius Aurelianus, Galen, Oribasius and Ætius. He is mentioned again by Juvenal in Satire XIII.: "Let not the runner, who is in his senses and therefore does not need the services of the physician Archigenes, hesitate to wish for the rich man's gout," *i. e.*, for wealth even at the cost of health. And again in Satire XIV.: "Already your long and stag-like old age torments your heir; make haste, and look up Archigenes and purchase from him the compound of Mithridates, if you wish to pluck another fig or again to handle roses," *i. e.*, to live longer. "You must get the antidote which a father no less than a king needs before meals."

When his friend Ursidius contemplates marriage and thinks he has found a chaste wife, Juvenal exclaims in Satire VI.: "O physicians! open the middle vein, he is mad!" This refers to the custom, then prevalent, of bleeding insane persons from the *vena media* of the arm.

In Satire VI., the physicians are represented to have been sad when a child whom they were attending became very ill, but there is no intimation that their sorrow was unreal.

There are fewer references to diseases and operations in Juvenal than in Horace: "Corruption is communicated, as when in the fields a whole herd falls by the scab and measles of one swine";[2] "dogs are rendered hairless by an old mange"—*scabie vetusta*.[3]

Referring to the marriage of males, a practice in vogue among the upper classes at Rome and mentioned also by Horace, and to those who imitated women, he says:[4] "But what do they wait for, for whom it is now high time in the Phrygian manner to cut away their superfluous flesh?" *i. e.*, to castrate them. The gladiator with whom the senator's wife eloped is described[5] as being adorned with "a great wen in the middle of his nostrils," *ingens gibbus, mediis in naribus*, probably some large tumor caused by repeated blows upon the part. Nor was this his only attraction; he had also[6] "the sharp evil of an ever-dropping eye," *acre malum semper stillantis ocelli*, fretting and disfiguring his face. "But he was a gladiator! This makes them hyacinths! Him she preferred to her children, her country, her sister and her husband. It is the sword they love."[7]

In Satire VI., the Roman husband is represented as driving from his house his wife who is growing old and losing her charms: "Collect your traps and get out," says his freedman, "you wipe your nose too often; quick, make haste, there comes another with a dry nose"—*sicco naso*—*i. e.*, a young wife. In the same Satire, it is said that certain things would excite even the passion of Priam and the hernia of Nestor; that is, neither age nor even bodily defects are protections against them. Nestor, King of Pylos, is said to have lived three ages and to have had a hernia. Whether it was a genuine hernia or not, is uncertain, since several affections of the scrotum and adjacent parts were included under this name. We have, also, a woman consulting an astrologer about the death of her "jaundiced mother"—*ictericæ matris*.

We find also the expressions *quartana, quarta dies torrens*, "quartan fever"; *varicosus haruspex*, "the broken-veined soothsayer"; *furor*, "madness"; *phrenesis*, "insanity"; *loripes*, "a youth with club-foot"; *strumosus*, "a scrofulous person"; *Rutilæ gibbus*, "the hump of Rutila"; *phthisis et vomicæ putres et dimidium crus*, "consumption, putrid abscesses and a shriveled leg"; and *podagra*, "gout." Senile dementia is described; circumcision is alluded to in the expression *præputia ponere*, and the birth of triplets recorded in the words *pueros tres in gremium patris fundere simul*. There was a priest of Bellona who emasculated himself with a broken shell, *mollia qui rupta secuit genitalia testa*. Depilation of the body was practised by the young rakes of Rome—*resinata juventus*, "the perfumed youth"—in order to render themselves more inviting to the arms of their paramours.[8] Pliny, also, refers to this practice:[9] "*pudet confiteri maxi-*

[1a] The term "Doctor" meant at that day "Teacher" and was not applied to physicians, as now, until modern times.

[2] Satire II., 80. [3] Satire VIII., 34. [4] Satire II., 115.
[5] Satire VI., 108. [6] Ibid., 109.

[7] Two years ago, there appeared in a New York paper an account of the elopement to Europe of a celebrated prize-fighter and a charming young actress. "Jim," she is reported to have said, "why do women adore a conqueror of men? You are indeed a gladiator that all Rome might have been proud of"; and the actress smiled sweetly and tossed a small bouquet into the fighter's lap. This episode and the recent experience of a young naval officer, show that 2000 years have not dissipated the hero-worship of women. [8] Satire VIII., 115. [9] Liber XIV., 20

mum jam honorem esse in evellendis ab virorum corporibus pilis." The operation of excising growths about the anus is thought to be referred to in Satire II.: "*Podice lævi cæduntur tumidæ, medico ridente, mariscæ.*"[8a] Goitre and a peculiar hypertrophy of the breast, not understood by the annotators, are referred to in Satire XIII.: "*Quis tumidum guttur miratur in Alpibus, aut quis in Meræ crasso majorem infante mamillam?*"—"who marvels at goitre in the Alps; who, in Merœ, at the breast larger than a fat baby?"

There are still fewer allusions to the organs and remedies. The liver is mentioned as the seat of anger but not of lust, as in Horace; "*substringere bilem*" is to restrain one's anger only; the heart presides over the intelligence. Both *stomachus* and *venter* are used for the organs of digestion. *Ægrum cor,* is a distempered heart; *cerebrum,* head; *viscera,* intestines; *lumbi,* loins; *pulmo,* lung—"to shake one's lungs with laughter"; "the lungs burn with wine." We also meet with the words, *guttur, vena, medulla, præcordia* and *alvus.*

The idea of diseases being manifestations of the wrath of an offended deity, common among the ignorant and superstitious in all ages, is conveyed by the lines "Moreover if they have begun to suffer a pain in the side with a sleepless fever, they believe the disease sent to their body by some hostile deity; they think these things the stones and darts of the Gods."[8b]

Among drugs, hemlock is mentioned: "Athens bestows nothing but cold hemlock" (*gelidas cicutas*) "upon poor Socrates." The herb *eruca* (rocket), referred to in Satire IX., is said by Celsus to cause a burning sensation and to act as a diuretic: "Do thou only impress thy tooth on rockets," says Juvenal to Nævolus, the professional panderer, "and another greater hope remains to thee." Ovid[10] calls it "*eruca salax.*" Tigellinus, the infamous favorite of the Emperor, gives *aconita* (wolfsbane) and other poisons, to three uncles.[11] In Satire VII. we find the expression: "What mortars (*mortaria*) now heal blind old men?" Bleeding was in general and perhaps, from an expression of Celsus, in excessive use at this time, and is often referred to. It was either general—from the arm—or by cups (*cucurbita ventosa*). These cups were made of horn or of brass, and were also applied dry for their derivative effect. Leeches are not mentioned. The celebrated antidote of Mithridates, King of Pontus and Bithynia, "by taking which daily, that monarch is said to have rendered himself proof against the dangers of poisons" (Celsus), is alluded to in Satire XIV. Its heterogeneous ingredients, thirty-seven in number, are given by Celsus, who directs that they be bruised, mixed with honey, and a piece the size of a sweet almond be given in a glass of wine. It is hard to comprehend how a composition which appears to us so worthless, and which has fallen into such deserved neglect, ever could have had the reputation that this had. Such experience is calculated to impair our confidence in human judgment and in modern "specifics."

The use of the *fibula* or clasp, applied to the prepuce of young actors and singers to prevent copulation and preserve the voice, is mentioned several times by Juvenal. Celsus[12] describes the operation of infibulation, as follows: "Some surgeons have been accustomed to infibulate youths, sometimes on account of the voice, and sometimes of the health. It is done as follows: the skin covering the glans is drawn out, marked on either side at points where it is to be perforated, and then released. If the marks return over the glans, too much has been taken up and it ought to be marked nearer the extremity. If the glans be free from these, that is the proper place for the clasp. Then, where the marks are, the skin is pierced with a needle and thread and the two ends of the latter are tied together. The thread is now pulled back and forth daily, until small cicatrices form around the openings. When these have become strong, the thread is removed and a fibula is applied, which is the better as it is the lighter." This operation does not seem to have been always an effective barrier to the fair Romans, for Juvenal says:[13] "*Solvitur his* (*i. e., feminis*) *magno comœdi fibula.*" And again:[14] "*Si gaudet cantu nullius fibula durat vocem vendentis prætoribus.*" And Martial says: "*Fibula quid præstat? carius ut futuant.*" Celsus,[15] as we might suppose, disapproves of the operation: "*sed hoc quidem sæpius inter supervacua quam inter necessaria est,*"—"but this operation is oftener superfluous than necessary." It is not mentioned in the works of later Greek and Roman physicians, such as Galen, Aurelianus, Ætius, Paulus Ægineta, and would appear, therefore, to have fallen into early desuetude. An analogous operation is said to have been practiced upon girls by passing a ring or pin through the labia so as to close the vaginal orifice. According to Ploss, the Nubians and many other races still practice it as part of their religious ceremonial (Williams, *Obstetrics,* p. 25).

Juvenal repeats the complaints of the deadly autumn, "*autumnus letiferus,*" which we found so frequent in Horace.

"*Taberna,*" Satire II., was a shop where perfumes, "*opobalsama,*" etc., were sold, and was presided over by the *pharmacopola.* You will recall how Horace describes the *pharmacopolæ* as grieving over the death of their patron, the singer Tigellius. It is probable that they were the dispensers of medicines to the poor, as there were no drug-stores proper at Rome.

As bearing upon the daily experience of the medical contemporaries of Juvenal, as they went about visiting their patients, and also as indicating the source and character of some of their practice, may be cited, in conclusion, some remarks upon the condition of the streets and houses and the insecurity of life at Rome, to be found in Satire III., where Juvenal's old friend Umbritius is leaving the city in disgust. A thousand perils environ the citizens of the fell city. The unsafe condition of the dark houses is first depicted; according

[8a] The *po dex lævis* is also referred to by Martial. It and the *mariscæ* were results of unnatural practices (pæderasty). See J. Maschka, *Handb. d. Gerichtl. Medicin,* Band. III, Tubingen, 1882, pp. 182, 183; also J. Rosenbaum, *Geschichte d. Lustseuche im Alterthume,* Halle, 1882, pp. 135, 137.

[8b] XIII, 229. [10] *Remedia Amoris,* 799. [11] Satire I., 158.

[12] Liber VII., 25, 3. [13] Satire VI., 73.

[14] Satire VI., 378. [15] Liber VII., 25.

to Umbritius, a great many of them are supported with props which however do not prevent their frequent falling, and there are many chinks and gaps in the ancient walls; fires are of common occurrence. Owing to the great noise in the streets, none but the rich can sleep, and many an invalid dies from want of rest. For a stream of carriages is continually passing in the narrow and crooked thoroughfares, and the drivers are perpetually engaged in noisy disputes and foul abuse of one another. If you are in haste, your passage is obstructed by the crowd. A rich man's litter, borne aloft upon stout shoulders, jostles you aside; those behind press upon your back; one man digs into you with his elbow, another with a hard pole; your shoulder is struck by a joist, your head by a beam, and a cask is thrust against your shins. Your legs are bespattered with mud, on all sides you are trodden on and the nail of a soldier's boot sticks in your toe. The cooks scatter the burning coals as they hurry by with their patrons' meals, and your clothing is torn into shreds. One wagon loaded with a fir-tree, another with a huge pine, shake the streets as they advance, the ends waving to and fro, threatening the people. Another wagon is loaded with stones from the quarries of the Apennines, and woe betide if the axle break and the mass be precipitated on the people. Who could find their scattered limbs or gather up the carcasses ground to powder? Then there are the dangers of the night when broken crockery, thrown out of the lofty windows, makes dents in the pavement and threatens to break one's skull. Indeed, there are as many fates awaiting you as there are open windows where you pass. You may thank your lucky stars if they throw only the contents of the basins and pots upon you. Rash will he be thought who goes to supper without having made his will. Or your life is put in jeopardy by some drunken and ill-tempered fellow, ready to pick a quarrel with the first person he meets. He takes care to avoid the scarlet cloak and the long train of attendants, the many lights and the brazen lamp, but you whom the moon alone attends, he despises. Or you meet a worse fate if you fall into the hands of the numerous robbers, driven by the soldiers out of their lairs in the neighboring Pontine marshes and forced to seek refuge within the city's limits.

This language may appear exaggerated, but Horace[16] speaks in similar strains, inveighing against the noise and smoke, and telling of "a builder in heat who hurries along with his mules and porters: the crane hurls aloft at one time a stone, at another a great piece of timber: the dismal funerals dispute the way with the unwieldy carriages: here runs a mad dog, there rushes a sow begrimed with mire."

And Propertius speaks of similar dangers in the line:

Præterea domibus flammam, domibusque ruinam.

Such are the all-too-brief glimpses of medical life and thought in imperial Rome which we glean from the writings of the greatest satirist of all ages.

[16] Epist. II., 2, 72.

NOTES ON NEW BOOKS.

Saunders Question Compends. Essentials of Histology. By Louis Leboy, B. S., M. D., Professor of Histology and Pathology in Vanderbilt University Medical and Dental Departments, Bacteriologist to the State of Tennessee, Pathologist to Nashville City Hospital. 263 pages with 92 illustrations, second edition revised and enlarged. (*Philadelphia and London: W. B. Saunders & Co., 1902.*)

This book contains a short account of the principal points in histology. The facts contained are in the main correct, but it is not to be recommended to those desiring more than the most superficial view of the subject.

Bacteriological Technique. A Laboratory Guide for the Medical, Dental, and Technical Student. By J. W. H. Eyre, M. D., F. R. S., Edin., Bacteriologist to Guy's Hospital, and Lecturer on Bacteriology at the Medical and Dental Schools, etc. Octavo of 375 pages, with 170 illustrations. Cloth, $2.50 net. (*Philadelphia and London: W. B. Saunders & Co., 1902.*)

The methods of bacteriological technique have of late years so multiplied that some method of easy access becomes very desirable. The present book gives an account of the ordinary methods in use in bacteriology and also many of those used for more special purposes. The use of the terminology introduced by Chester is to be commended as tending to simplicity and rendering the descriptions of bacteria and their cultural characteristics more uniform.

The omission of *Bacillus dysenteriæ* (Shiga) from the pathogenic bacteria considered will probably be rectified in a future edition. The book as a whole is to be commended as fairly well representing the present methods used in bacteriology.

Transactions of the American Rœntgen Ray Society. Third Annual Meeting, Chicago, Ill., December 10 and 11, 1902. (*Louisville: Courier-Journal Job Printing Co., 1903.*)

The Transactions of the American Rœntgen Ray Society will be read with great interest by those interested in the advancement of the science of X-ray. The present report, besides giving the details of the organization of the Society, contains a number of most excellent articles.

These articles for the most part deal with the therapeutic value of the X-ray. A careful study of the data given seems to show that omitting the analgesic effects the value of the X-ray on deep-seated growths is limited; but on the other hand its use in the treatment of superficial growths and other forms of skin lesions has markedly increased.

The paper of Dr. T. P. Hall entitled X-ray Physics deserves more than a passing notice. We have given us in a short, concise form all the physical properties of the ray and the various theories as to its nature. The greatest stress, however, is laid upon the generally accepted theory, that this form of energy is merely a series of very short waves given off from the anode when it is bombarded by the cathode ray. This theory explains quite readily why the penetration varies according to the atomic weight of the substance examined.

In another part of the report attention is called to the fact that burns can be produced just as readily with the static machine as with the coil. The three factors in the production of a burn; namely, the amount of energy sent through a tube, the length of exposure and the frequency of exposure; must be considered just as much when the static machine is used.

The report makes a useful addition to the library of a radiographer.

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